Chapter 3

Natural and Cultural Resources

Maine supports a wide variety of natural and cultural resources. There are vast forestlands, lakes, mountains, islands, tidal and inland wetlands, and special cultural resources. Many of the most spectacular of these features are located in LURC jurisdiction. Some features date back to earlier geologic times, while others reflect human intervention. All are part of the ever-changing ecosystems which collectively comprise the state's resource base. Each natural resource has economic, recreational, and environmental values and is, therefore, subject to conflicts over decisions about land use and resource allocation.

This chapter of the Commission's Comprehensive Land Use Plan contains a detailed description of the jurisdiction's natural resources and a discussion of the issues pertaining to them.

Agricultural Resources

A relatively small portion of the area within the Commission's jurisdiction is used for agricultural production. A number of factors contribute to agriculture's limited presence. Many of the soils are poorly suited to agriculture, services and markets are distant, and the pattern of land ownership, in which the bulk of land is held by large landholders for timber production, has limited the availability of land for agriculture.

Despite its limited presence, agriculture is important to the jurisdiction. Agriculture makes a significant contribution to local and regional economies, and is an important part of the culture and heritage of many rural areas. Working farms keep significant lands in open space, and help to maintain the tradition of the jurisdiction as a place where resource-based uses predominate.

While agriculture is not presently widespread in the jurisdiction, the potential for future expansion remains. The predominance of undeveloped land, general absence of incompatible uses, and presence of areas of good soil make some areas suitable for agriculture.

Prime agricultural soils are a limited and irreplaceable resource. Little information is available on the occurrence of prime agricultural soils in the jurisdiction because soil surveys have not been completed for many areas. Because of the importance of maintaining the ability to feed ourselves, these soils are considered a valuable resource worthy of protection wherever they are found.

Potatoes and blueberries are the major cultivated crops in LURC jurisdiction. In 1992, 73,000 acres of potatoes were cultivated in Aroostook County, including acreage in towns not subject to LURC jurisdiction. The acreage of potatoes in cultivation has declined by about 25,000 acres in the past 10 years, of which 5,000 to 10,000 acres is estimated to be in LURC jurisdiction. Nevertheless, some of the acreage that has been taken out of production in recent years will continue to be used for hay or potato seed production, and experimentation with alternative crops continues.

Most blueberry production in the state takes place in Washington County, with a substantial amount occurring in LURC jurisdiction. The market for blueberries has been very strong. As a result, blueberry production has increased in the past 10 years and this trend is likely to continue. Several thousand acres in LURC jurisdiction have been converted to blueberry fields in recent years, many of which were previously abandoned blueberry fields that had reforested. Conversion is likely to

Aroostook County farm land

continue if the market for blueberries remains strong. Growers are also working to increase production per acre with the help of new fertilizers and irrigation. Eighty million pounds of blueberries were produced in the state in 1992, providing a significant boost to the regional economy of eastern Maine.

Cranberries are not presently a significant agricultural product in the state. Cranberry farming is expected to increase over the long-term because of the strong cranberry market. This increase is likely to be focused in Washington and Hancock counties where processing facilities are available.

Smaller amounts of land in the jurisdiction are devoted to other forms of agricultural production, including poultry, apples, broccoli and other vegetables, and dairy and beef cattle. The production of maple syrup has expanded significantly, more than doubling since 1981. Consistent with agricultural trends, sugaring operations are fewer in number than 10 years ago, but larger in size.

Maple syrup generated about $2 million statewide in the early 1990's (about 100,000 gallons per year). Most production in the state takes place in LURC jurisdiction, with the bulk of activity focused in the northwest along the Golden Road and townships bordering Quebec. Most operations are run by Canadian families which lease land from paper companies, process sap in Maine, and sell all of the syrup in the U.S., primarily within the state. Approximately 3,000 acres are leased for sugaring operations.

LURC Regulatory Approach

Most agricultural operations are located in the General Management (M-GN) Subdistrict. The General Management zone is intended to enable forestry and agriculture to occur with minimal interference from unrelated development in areas where the resource protection afforded by Protection Districts is not necessary. Agricultural management activities are statutorily exempt from regulation by the Commission in Management Subdistricts.

The Commission has another management zone, the Highly Productive Management (M-HP) Subdistrict, which is designed to ensure the continued availability of products from high yield or high value forest and/or agricultural lands by reserving areas for these uses. In the past, this

zone has not been applied due to the difficulty of defining qualifying lands. Until this issue is resolved, the Commission reaffirms its commitment to maintaining prime agricultural lands where they have been identified.

Agricultural Resource Issues

The major factors affecting the future of agricultural resources are economic. The removal of land from food production is an issue of global and national importance, yet is extremely difficult to address due to the dynamic and interconnected nature of the marketplace. Diversification and innovation may prove to be key to the future viability of agriculture within the jurisdiction. In light of reductions in potato production over the past decade, the reemergence of blueberry and maple syrup production are encouraging trends.

The issue of greatest concern is development and fragmentation of the jurisdiction's remaining agricultural lands, especially those with prime agricultural soils or other characteristics that make them well-suited to agricultural production. When agricultural land is abandoned, the opportunity still remains to return it to agricultural use in the future in response to changing circumstances and markets. Once land is developed or topsoil removed and sold, however, the option of restoring the land to agricultural use is essentially eliminated. The Commission will discourage fragmentation of prime agricultural land and guide development away from these areas.

In order to remain competitive, most agricultural operations must use the land intensively and take measures to reduce crop and soil loss. While use of fertilizers, pesticides and herbicides, and diversion of water for irrigation boost productivity, these activities need to be conducted with care to ensure that they do not create excessive impacts on natural resources and neighboring land uses. Soil erosion and sedimentation are also common by-products of agricultural operations. The state has developed best management practices for agriculture and other significant land uses. Adherence to these practices can significantly minimize adverse impacts on surrounding resources.

The trend toward larger maple syrup sugaring operations, many of which are in remote locations, has brought with it a need for more extensive accommodations to house workers and equipment. When issuing permits for these facilities, the Commission has generally stipulated that the facilities shall not be used for other purposes, unless it specifically approves the other uses.

Agriculture is not always compatible with residential or commercial uses because of conditions such as noise, dust, and smells. As residential development encroaches on farmland, conflicts sometimes arise between the two land uses. By separating incompatible land uses and encouraging residential development to locate away from working farms, the Commission will help to prevent these conflicts.

Air Resources

Areas within LURC jurisdiction are generally distinguished by clean air and good visibility. Clean air contributes to the maintenance of healthy forests, waterbodies, and wildlife in the region, and smog-free skies are important to residents and recreational visitors.

The forest plays an important role in maintaining good air quality, regionally and globally. It produces oxygen, necessary to human survival, and absorbs carbon dioxide, a greenhouse gas that plays an important role in regulating the earth's climate. The forest also removes air pollutants from the atmosphere and is vulnerable to damage by these compounds.

Local sources of air pollution include sulfate-processing pulp mills adjacent to the jurisdiction, insecticide and herbicide spraying associated with timber management and agriculture, open burning dumps, forest fires, woodburning stoves, vehicle emissions, logging roads (dust) and biomass plants. Open burning dumps are no longer permitted by the Department of Environmental Protection (DEP), but a small number remain in existence. They will probably be phased out within the next few years as part of DEP's solid waste management program. Besides these more obvious pollution sources, a number of other facilities and uses occurring in the jurisdiction have the potential to create localized environmental nuisances, such as

excessive noise, obtrusive lighting and glare, and offensive odors.

Nonlocal sources of air pollution are principally population and industrial centers on the east coast, in the Midwest, and in southern Canada. These areas generate suspended particulate matter, sulfur oxides, carbon monoxide, hydrocarbons, heavy metals, and nitrogen oxides, all of which are transported long distances in the atmosphere.

The Commission has no authority to control sources of air pollution outside its jurisdiction, but it has a vested interest in tracking air quality because of its potential to affect other natural resources

Impacts on Aquatic Systems

Acid rain occurs when air pollutants, particularly sulfur dioxide and nitrogen oxides, combine with water to form acids. Since the phenomenon of acid rain was first identified, there has been considerable concern about its potential impacts on lakes and streams.

Research suggests that lake acidification is not currently a serious problem in Maine, due in part to its geographic position as the state farthest downwind of emission sources in the midwest and east coast. Maine has the lowest percentage of acidic lakes in the Northeast region and the trend, based on available historical data, seems to be toward slightly decreased acidity over the past 10 to 40 years. Recent data suggest that acid precipitation is declining, consistent with implementation of controls instituted by the Clean Air Act. Few, if any, additional lakes are expected to become acidic in the next few decades at levels of deposition evident in the early 1990's.

Acid rain has had little apparent effect on Maine streams although research in this area has been limited. Acidity may limit the distribution of some fish species, but definitive evidence of this is lacking.

The presence of mercury in the environment is a topic of growing concern and study. High levels of mercury have been found in some fish, including fish from pristine inland lakes. Air pollution, and sediments contaminated by past industrial discharges are possible sources of mercury. Researchers suspect that lake conditions of low pH and low alkalinity make mercury available for

Bowater Mill at Millinocket

uptake by organisms. It is not yet known whether this is a widespread problem, and research continues in this area.

Impacts on Terrestrial Systems

Maine forests bear the chemical signature of exposure to air pollutants, but the long-term effects on forest health and productivity are still unknown. Air pollution delivers elevated levels of nitrogen, sulfur, ozone, heavy metals, carbon dioxide, and other compounds to forest ecosystems. These materials are changing the chemical and biological characteristics of forest soils. Accumulated trace metals are evident in forest soils, and although levels in Maine forests are lower than those in states to the south, they are still clearly above pre-industrial conditions.

Tropospheric ozone is a secondary pollutant; it is not emitted directly from a source, but is formed from hydrocarbons, nitrogen oxides, and sunlight at the earth's surface. Hydrocarbons are emitted principally by automobiles and industrial uses utilizing petroleum-based products. Nitrogen oxides are emitted by combustion sources. It is estimated that most ozone in Maine is transported here from urban areas outside the state or generated in the atmosphere en route to Maine, although some is generated from local sources.

Ozone is considered the most damaging air pollutant on a regional basis (excluding impacts near point sources). Widespread regions of the eastern U.S. experience episodes of elevated ozone levels that are thought to be harmful to trees. According to recent studies, some vegetation damage does occur at levels below the federal ozone standard. Eastern white pine is particularly sensitive to ozone. Ozone levels throughout Maine periodically exceed state and federal standards, and researchers suspect that chronic and possibly acute ozone damage does exist in Maine's forest.

Tropospheric ozone should not be confused with stratospheric ozone. Seven miles up in the atmosphere, a natural stratospheric ozone layer shields the earth from cancer-causing ultraviolet rays. Chemical reactions caused by fluorocarbons in aerosol cans and other products reduce this protective ozone layer.

Heavy metals such as lead, zinc, cadmium, copper, chromium, mercury, and vanadium generally originate from fossil fuel combustion, refuse incineration, and industrial processes, as well as natural sources such as volcanic emissions, and can travel long distances in the air to remote Maine forests. Once deposited in the forest, these metals remain in the ecosystem for a very long time. Research indicates that recent mercury deposition exceeds background levels by a factor of three or more.

Forests at high elevations are especially vulnerable to damage by air pollutants. Subject to greater precipitation, cloud frequency, and exposure, these forests receive much higher levels of certain pollutants than lowland areas. It is believed that this pollution has contributed to declines in high elevation spruce and fir forests in the Appalachians of the Eastern United States over the past two decades.

The lack of long-term data and the complexity of forest ecosystems make it difficult to draw conclusions about the impact of air pollutants on the forest; nevertheless, many suspect that trees weakened by exposure to pollutants may be more susceptible to damage by insects and disease. A decline in forest health and productivity could dramatically affect the region, biologically and economically.

Impacts on Human Health

Air pollutants have the potential to adversely affect human health. Most health effects are respiratory in nature. High concentrations of particular pollutants can cause breathing problems for specific population groups such as the elderly, children, and people with respiratory problems. Ground-level ozone periodically exceeds state and federal standards in many areas of the state during the summer and affects many such groups. Long-term exposure to low levels of certain air pollutants is suspected as a possible cause of some diseases. Reductions in stratospheric ozone, which shields the earth from cancer-causing ultraviolet rays, is also of concern.

LURC Regulatory Approach

Most air pollutants are regulated by the Maine Department of Environmental Protection which administers air quality standards. Nevertheless, the Commission does play a role in monitoring and protecting air quality, principally through the permitting process.

The Commission's authority in regulating air quality is broad, deriving from two statutory criteria: (1) that the Commission approve no application, unless "adequate technical and financial provision

has been made for complying with the requirements of the state's air and water pollution control and other environmental laws...", and (2) that "adequate provision has been made... to assure there will be no undue adverse effect on..." natural resources. In reviewing individual projects within its jurisdiction, the Commission considers air quality issues, but relies heavily on DEP review under other air quality laws, especially on larger projects.

Air Resource Issues

Most issues associated with air resources revolve around uses of air (principally emission of air pollutants) and their effects on other valued resources and ecosystems. There are no significant issues regarding air resources that are within the Commission's realm of authority. Nevertheless, the Commission recognizes the importance of understanding and tracking the effects of air pollution on other valued resources, such as lakes and forests.

Coastal Resources

While most of the Commission's jurisdiction is located well inland, a small portion borders the coast. Two mainland townships, Trescott and Edmunds, have considerable ocean frontage between Machias and Eastport. The jurisdiction's most significant coastal resources, however, are 308 islands, located mostly in the mid-coastal part of the state. These resources include two island plantations, 208 named islands and 98 unnamed islands and ledges, and represent about 10% of the total number of coastal islands in Maine.

Although the total land area of these islands is small in relation to the rest of the jurisdiction, they warrant extended discussion and special consideration for several reasons. First, they possess outstanding economic, recreational, cultural, aesthetic and natural resource values, and are a defining feature of Maine's magnificent coastline. Second, their natural and human environments differ significantly from those of mainland areas and present a distinct set of planning and land use issues. Third, as coastal areas, many islands are attractive locations for development, and are likely to experience development pressure during the 1990's.

Most of the islands in LURC's jurisdiction can be cast into four geographic groups. The Muscungus Bay group is located at the mouth of the Medomak River near Bristol. The Muscle Cove group is located east of St. George. The East Penobscot Bay Group is situated west of Deer Isle. The outer island group is composed of islands more than five miles from the mainland.

Physical and Natural Characteristics

Many unique features of islands are a result of their isolation, small size and exposure to the marine environment. Surrounded by ocean, islands have evolved separately from mainland areas, resulting in an environment that is distinctive yet sensitive to natural disturbance. The small size of the islands – the largest within the jurisdiction is only 1,000 acres – and their exposure also make them vulnerable to the constant stresses of winds, waves, tides, salt, ice and animals, and to human activities. Generally, the larger the island, the more diverse its ecosystem, the more varied and numerous its plant and animal life, and the more tolerant it is of disturbance.

The island climate is strongly influenced by the ocean, which acts as a moderating agent. Summers are generally cooler and wetter than on the mainland, with many more foggy days. This cooler climate allows for the growth of some boreal and sub-arctic plant species that are found further to the north on the mainland. Island winters, on the other hand, are warmer and rainier than on the mainland, allowing some plant species to extend their range northward.

Island soils are typically acidic, infertile, and shallow, with a thin organic layer. Larger islands often contain marshes and bogs. Vegetative cover varies, depending on local conditions, soil type and past clearing practices. Most larger islands

are forested, and mature softwood stands predominate on many islands. The Maine islands, in fact, have the greatest concentration of old growth spruce left in the state.

Groundwater is the main source of freshwater on islands, but supplies are generally limited and sensitive to contamination and depletion. Island groundwater is generated entirely by rain and snowfall on the island itself, which percolates into the soil and rock. On islands, recharge of groundwater supplies can be greatly reduced by impervious surfaces that cause stormwater to flow to the ocean rather than infiltrate into the ground.

The interface between groundwater and the salt water that lies around and often under the island is always moving, depending on rainfall, tides, the characteristics of the groundwater supply and, if the island is populated, water usage. In many cases, island groundwater actually floats on top of a more dense layer of saltwater. High groundwater demand or the siting of wells near this interface can cause intrusions of saltwater into the groundwater supply.

Although larger islands may be comprised of a number of ecosystems, each island can be viewed as a distinct ecological unit with limited outside interactions and a unique set of local conditions. This means the ecology of individual islands varies considerably from that of the mainland and of other islands. It also means that the level of biological diversity and equilibrium on islands is more often a result of relative isolation than of continuous interactions with diverse ecological and human forces, as is the case on the mainland. Under these conditions, the introduction of new forces or activities can have a particularly dramatic impact on island ecology.

Island wildlife resources are typically less diverse and more fragile than on mainland areas. Species generally are limited to those that can swim or fly – or have been introduced, intentionally or unintentionally. A number of species fill ecological niches usually occupied by other animals on the mainland, and lack of predators has resulted in large communities of certain species. Many islands have an abundance of white tail deer as well as large populations of small rodents. As mentioned previously, larger islands tend to have more diverse and stable wildlife populations.

Coastal islands are especially valuable for the migratory and resident birds they harbor, some of which are endangered or threatened. Many islands within the jurisdiction provide essential nesting sites for a variety of significant seabirds including eider ducks, puffins, black guillemots, terns, leach's storm petrels, razorbill auks, cormorants and gulls. Shore and wading birds are abundant on islands, and a variety of terrestrial birds are also present. Two large raptor species, ospreys and bald eagles, often nest on islands, as do herons. A number of bald eagle nest sites have been identified on islands in the jurisdiction. The inventory and mapping of important bird nesting sites is still incomplete for many islands; this deficiency makes planning for their protection more difficult.

An initial impetus for use and settlement of islands was their proximity to fishery resources. A variety of fish species inhabit coastal island waters, with lobsters an especially important resource. Marine mammals also frequent nearby waters, and seal haulouts have been identified on a number of islands and ledges.

Land Use Characteristics

Up until the early 1900's, many Maine islands were intensively logged, farmed, grazed and quarried. Year-round island communities were common – in many cases, island settlement preceded that of mainland areas. Fishing was the economic mainstay of most island communities.

Depletion of island resources and declining markets in the late 19th and early 20th century led to abandonment of many islands, and today, the only islands within the jurisdiction with year-round populations are Monhegan and Matinicus Plantations. Most islands reverted to a relatively natural state. On many islands, there has been no significant timber harvesting or clearing since the early 1900's.

New development pressures, however, have the potential to significantly alter the island landscape. Improvements in transportation and growing recreational boat ownership make islands more accessible now than ever. While year-round settlement has declined, second-home development is a trend that is likely to accelerate in the 1990's.

Tourism and recreational use are also a growing trend on Maine islands, especially on larger, populated ones. Monhegan saw an especially dramatic increase in "daytrippers" during the 1980's, and visits to other islands probably grew as well. Boating, hiking, biking and nature study are the most popular island recreational activities.

On islands with mature stands of spruce and fir, timber harvesting is a likely future trend. These

operations can yield economic benefits and remove the fire danger posed by dead and dying trees. Yet harvests on islands have potential to be highly visible – especially on islands with significant changes in topography.

Land use and development activities on particular islands vary tremendously, so for planning purposes it is helpful to make distinctions among islands within the LURC jurisdiction.

Islands With Year-round Populations

Two island plantations, Monhegan and Matinicus, stand apart due to their year-round communities, large seasonal populations, full-range of services and regular ferry service. The communities that have evolved on these islands are unique – the combination of social, cultural and economic factors, vernacular architecture and distinctive physical environments has created a special character that can be considered an important resource in its own right.

Some of the land use and development characteristics of Monhegan and Matinicus parallel those of small mainland coastal towns. The constraints of size and isolation, however, have accentuated certain land use characteristics and resulted in some unique patterns and trends.

The harbor areas of both islands are the focus of most land use and development activities. Distinct villages have evolved on the slopes adjacent to the harbors. On Monhegan, almost all housing and businesses are located within or near the village area; on Matinicus, several additional concentrations of development are located along the island's interior road system.

Economic options on Matinicus and Monhegan are considerably more limited than those on the mainland; most working islanders are involved in fishing or tourism – or both. Fishing has historically been the economic mainstay of both islands, and it remains so, with wintertime lobstering the most profitable pursuit. The large influx of seasonal residents has long provided a boost to the local economies of both islands. On Monhegan, the recent increase in "daytrippers" and short-term visitors has spawned a newer form of tourism.

Development activity on both islands was generally light during the 1980's and early 1990's. The 1990 Census, in fact, showed a significant decrease in the number of year-round homes from the previous decade. Most of these dwellings were converted to seasonal use. Much development has been in the form of enlargement of existing buildings, conversions to commercial and lodging facilities, and occasional construction of new seasonal dwellings.

Other Islands

Approximately 15 islands in LURC jurisdiction have summer communities comprised of 5 or more residences. These are mostly larger islands (50 acres or more) and, with the exception of Metinic, Large Green and Criehaven islands, they are located relatively close to the mainland. Services on these islands are generally limited, with visitors dependent on their own transportation. Many of these islands once had thriving year-round communities, and some retain the character of those earlier times. Criehaven Township, also known as Ragged Island, was the last to have a significant year-round community. An intact harbor village remains, and during the summer months a number of fishermen return to live and work there.

Since 1985, the Commission has issued 15 permits for construction of seasonal homes on these islands. The most building permits have been issued on Metinic (6) and Eagle (4), with the rest scattered among the other islands.

A number of smaller islands in the jurisdiction (10-15) are developed with a few seasonal camps. Many of these islands are owned by a single owner or family. On some islands these seasonal dwellings get little use, leaving the island relatively undisturbed.

The vast majority of the islands are undeveloped; many remain under single ownership. A number are owned by trusts. Some have remained undeveloped due to their small size, environmental constraints, or inaccessibility; others simply due to owner choice. Many of these undeveloped islands are popular picnic or fishing spots; several are regularly used as stopovers by the Hurricane Island Outward Bound School and users of the Maine Island Trail.

LURC Regulatory Approach

The Commission applies the same land use regulations and standards to islands as to the mainland. Island zoning consists of a similar mix of Development, Management and Protection

Districts with one exception: the Maritime Development (D-MT) Subdistrict is available to protect water-dependent uses such as fishing from competing and incompatible uses. Monhegan Island has a D-MT Subdistrict on a segment of its waterfront.

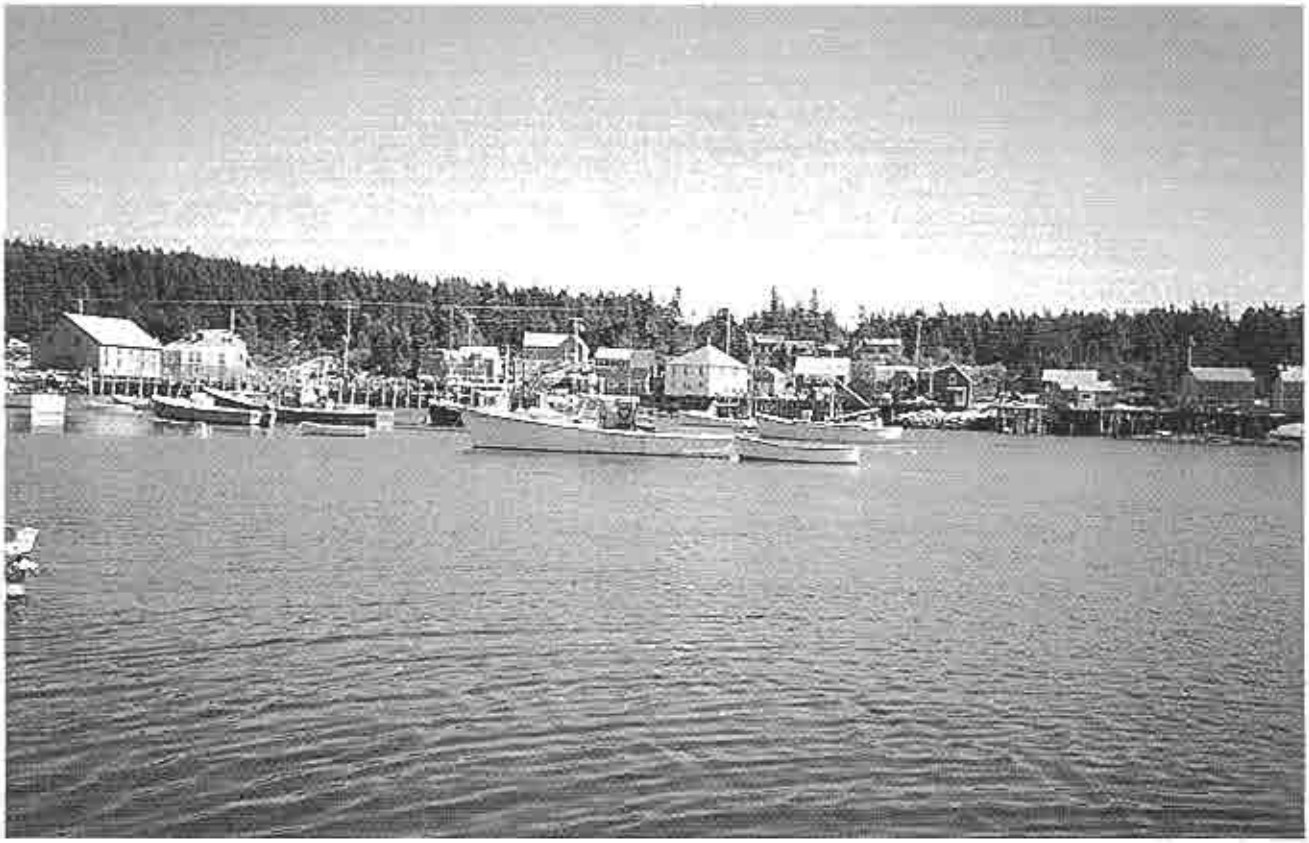
While the zoning pattern for Monhegan and Matinicus is relatively complex, it is quite simple for most undeveloped islands, often consisting of a General Management (M-GN) Subdistrict surrounded by a Shoreland Protection (P-SL) Subdistrict. Other subdistricts commonly found on islands include Residential Development (D-RS) zones, Fish and Wildlife (P-FW) Protection zones for protecting significant seabird nesting areas and Resource Plan (P-RP) zones for islands with special management needs. Due to the presence of diverse resources, a number of islands have overlapping zones; on Monhegan, several zones are overlaid to better protect multiple resources.

Coastal Resource Issues

The innate limits and sensitivity of the island environment become particularly important when considering islands with existing or proposed development. With a natural resource pool that is more circumscribed than mainland areas, the island environment is generally less forgiving of adverse impacts. Once an island resource such as groundwater or bird habitat has been degraded, options for mitigation are often limited and recovery, if possible, is slow.

The ability of land and water resources to support human activities and development is termed "carrying capacity." This concept is particularly relevant to island environments. The limited carrying capacities of most islands will be a major consideration in evaluating land use and development.

In discussing island issues, it is helpful to distinguish between the islands with year-round populations, those limited to seasonal populations and those with no development. A number of the issues facing year-round islands are present or emerging on other islands as well. To avoid repetition, these issues are given fullest treatment under the section on year-round islands.



Matinicus Island

Islands With Year-round Populations

Monhegan and Matinicus Plantations share a complex array of issues concerning both the human and natural environments on the islands. Some of the land use issues are at least partially addressed through the Commission's policies and regulations; other issues go well beyond the scope of LURC's powers and duties. Local information-gathering, education and nonregulatory actions can help to document and address many of these concerns. Monhegan's Inventory and Analysis (1992), developed by LURC with assistance from the Office of Community Development, provides an excellent basis for planning in the plantation, and could serve as a model for Matinicus.

On these island plantations, the concept of carrying capacity is particularly useful for several reasons. First, existing year-round and seasonal development already "consumes" a significant portion of available carrying capacity, making wise use of remaining capacity essential. Second, carrying capacity evaluation can be broadened to include impacts on island infrastructure and services, and on the character of the community as a whole.

While development activity on Monhegan and Matinicus has been relatively light in recent years, the limited carrying capacity of these islands requires that any development be evaluated carefully. Even one poorly sited building or new use can have a marked impact on natural and visual resources.

Increased tourism and recreational use can also deplete island carrying capacity. The rapid increase of daytrippers on Monhegan during the 1980's brought concerns that island trails, services and businesses would be unable to accommodate the influx. The amount of tourism is largely dependent on the availability of ferry service, and thus is not an easy impact to control.

The quantity and quality of drinking water is a primary carrying capacity issue on both these islands. Monhegan is served by a public system and private wells, Matinicus solely by private wells. While the amount of groundwater varies considerably based on local rainfall, increased water use, especially during summer months, has the potential to create shortages. On Monhegan, water shortages due to overuse of the island's meadow aquifer were reported in 1985 and the island has instituted a number of water conservation measures.

High water use can also cause saltwater intrusion problems, with potential for long-term degradation of the water supply. This is especially true of drilled wells located near the ocean, a preferred location for new homes. Water quality problems can also be caused by the septic systems that accompany new development or by malfunctioning existing systems. Unsuitable soils limit the ability of islands to accommodate subsurface waste disposal. Not only is the shallowness of island soils a problem, but the areas most apt to meet plumbing code requirements are coarse, excessively drained soils that provide easy access to groundwater.

State policy prohibits new overboard wastewater discharges, allowing existing overboard discharges to continue only if wastewater flows to the ocean are not increased. While this policy protects marine water quality, it requires discharging more treated wastewater into an island's groundwater as an alternative.

Although the ability of an island to support particular animal or plant species is largely dependent on natural and ecological factors, human activities can have direct detrimental impacts on these resources or indirect impacts by altering island ecology. The small size and isolation of islands accentuate these impacts. On mainland areas, development and human activities often reduce plant or animal communities in a particular area; on islands, these impacts may lead to the elimination of an entire community.

New development often results in the loss of wildlife habitat and disturbance of wildlife by increased human traffic and the introduction of household pets. Impact on nesting birds is the most critical issue. Some species have an extremely low tolerance for disturbance.

Plant communities are also sensitive to human activities and local management practices and decisions. Wildflowers abound, but their numbers and variety can be greatly reduced by hungry deer, picking by humans and foot traffic. At least one rare plant species, the Fringed Gentian, occurs on Monhegan.

Both Monhegan and Matinicus have significant populations of older spruce trees; on Monhegan, Cathedral Woods is an old growth red spruce stand with trees averaging 112 years in age. As trees on these islands continue to age, more aggressive forest management may be need-

ed to reduce fire danger, prevent the spread of disease and promote regeneration.

The issue of solid waste disposal relates to both environmental and community capacity. On the one hand, siting an island landfill is generally not feasible due to space constraints, poor soils, possible adverse groundwater impacts and costs. On the other hand, transporting waste to the mainland is expensive and logistically difficult. Recycling and composting have been embraced by both islands as a way of reducing solid waste generation.

Aesthetic concerns are often heightened on islands due to their small scale, exposed rocky coastline and prevalence of ocean views. This is especially true on Monhegan and Matinicus with their sloping topography and distinctive, historic village areas. While coastal villages can be aesthetically pleasing, newer buildings or additions can easily block existing ocean views or be in conflict with the prevailing architectural character.

To island residents and visitors, the visual and scenic qualities of islands are an important component of what makes them so special. Many other factors also contribute to island community character: close-knit social relationships, a slower pace of life, independence from the automobile, a seeming timelessness and lack of change, and a set of cultural traditions and rituals that have evolved over the years.

As islands are incrementally developed or more heavily visited by tourists, community character may be eroded long before environmental carrying capacity is surpassed. In some instances, these negative impacts can be minimized by proper management and by working to fit new developments into the community. Ultimately, however, a point is reached when even the most sensitively designed project begins to significantly erode community character.

As early centers of trade and settlement, islands are often rich in archaeological resources. A number of historic and prehistoric archaeological sites have been identified on islands within the jurisdiction, but survey work has generally been limited. New development has the potential to alter or obliterate unidentified sites.

Islands With Seasonal Populations

The islands within the jurisdiction with smaller seasonal populations are generally less-intensively developed and used than Monhegan and Matinicus. However, these islands may experience the most development pressure during the 1990's, especially those located close to mainland population centers.

Many of these islands already experience some of the issues faced by islands with year-round communities, and as seasonal use increases, more of these issues will arise. Groundwater use and septic impacts are particularly important considerations, especially on smaller islands. And as summer communities become larger, issues such as solid waste disposal will grow in importance.

Seasonal island development and tourism also have an impact on the mainland communities that serve as points of departure and arrival. Accommodating the parking needs of island visitors and summer residents is usually the most pressing problem. But other issues such as adequate boat mooring space and use of mainland services and facilities may also arise. Some of these issues can be addressed by good communication and coordination between island communities and their mainland neighbors.

Many seasonally populated or undeveloped islands were once more heavily developed and used, and they may be particularly rich in archaeological resources, especially vestiges of the more recent past. Abandoned quarries, cemeteries and foundations of early buildings are especially common. While many of these features may have only local historical importance, new development or neglect can result in the loss of significant sites that are an integral part of an island's heritage.

A number of seasonally developed islands are sites of mapped essential habitat for bald eagles. Others are habitat for colonial nesting birds. Human activities can easily disturb these areas.

Undeveloped Islands

The vast majority of islands in the jurisdiction are undeveloped, and probably most will remain so in the near future due to environmental constraints, inaccessibility and ownership patterns and preferences.

But modern engineering, construction and transportation technologies allow many long-standing constraints to be overcome. And landowner patterns and preferences are subject to change.

Ross Island

Many smaller islands are held in trust or by older individuals who have preferred to keep them undeveloped. But as trusts are dissolved or land passed on to family members, island interests often are subdivided, making the potential for development much greater.

On small islands, even one house and associated uses can have an adverse impact on the island's limited resources. Impacts on bird habitat may be especially devastating. The majority of mapped sites for colonial nesting birds are on undeveloped islands, as are identified seal haulouts.

Another concern is the visual impact of new structures on the previously undeveloped island landscape. A new house located on an exposed bluff can be a highly intrusive addition that is visible not only from the island but also from points far out at sea.

Planning and Zoning Issues

Considering some of the unique characteristics of islands, the Commission's policies and regulations must recognize and protect island resources and address some of their special planning needs. Since island based industries are often water dependent, the Commission recognizes the need to accommodate such water dependent uses in its regulations. The Maritime Development Subdistrict established on Monhegan is an example of how the Commission can accommodate such uses.

On most islands, the first 250 feet from the ocean high water mark is zoned Shoreland Protection (P-SL1). This zoning allows buildings if they are located 75 feet back from the ocean on lots as small as 20,000 square feet with 150 feet of ocean frontage. While these standards may be suitable for some islands with existing development, they may lead to relatively high densities that are inappropriate for smaller or undeveloped islands.

The potential increase in timber harvesting on islands has a number of planning and zoning implications. Changes in island landscapes resulting from harvests often evoke public concern, and the Commission is likely to field complaints regarding future logging operations. Although harvesting is allowed without a permit in General Management (M-GN) zones, the Commission encourages those contemplating harvesting operations to work cooperatively with interested parties.

The Commission has determined that a permit is needed for transporting logs through island shoreland districts. This requirement is appropriate in order to minimize adverse impacts on the island and ocean environment, but should not unnecessarily impede harvesting operations. The Commission recognizes the unique nature of timber harvesting on coastal islands in that, with the shoreland protection district encompassing the island, there may be little management zone left within which the landowner has maximum flexibility for managing timber stands.

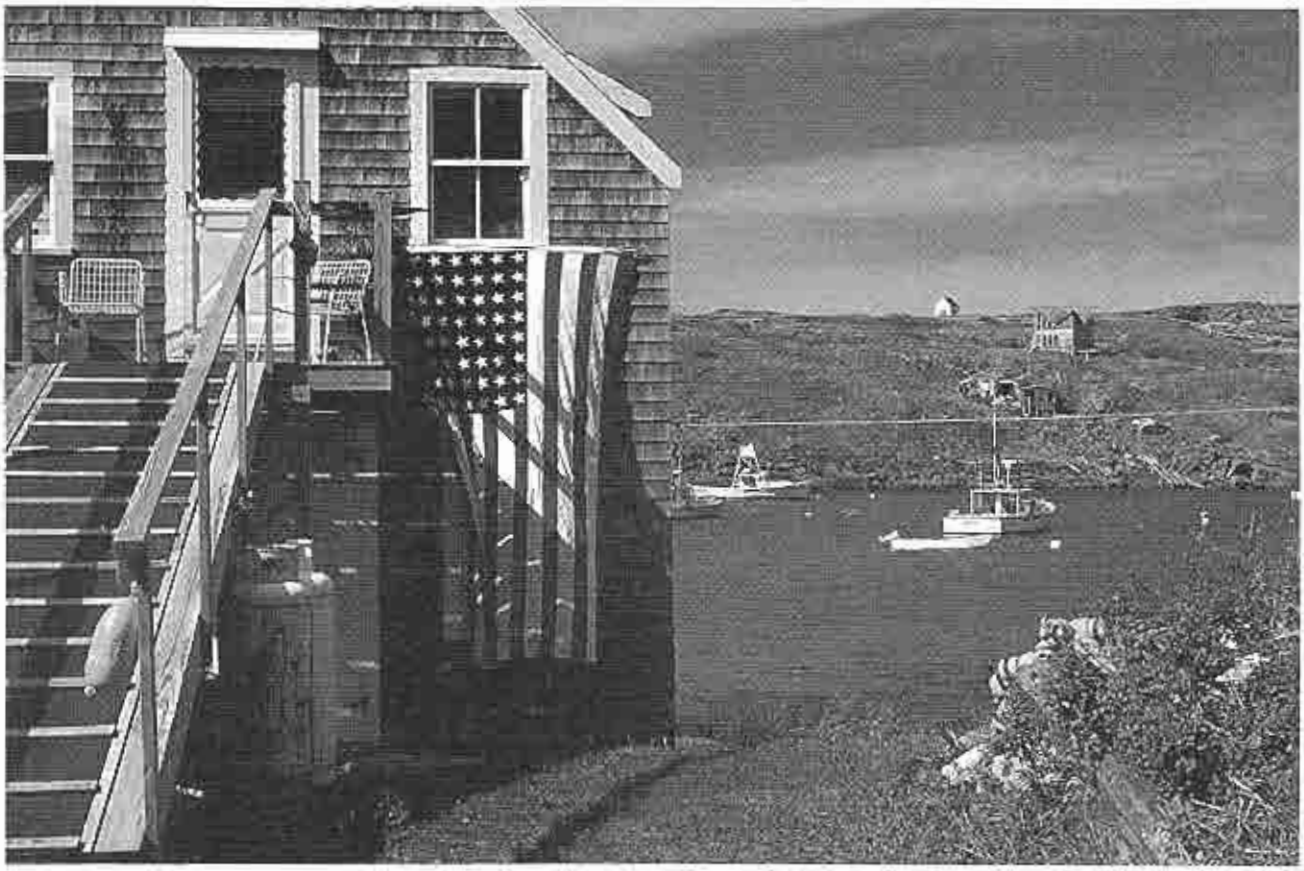
Many island dwellings were constructed prior to 1971, and have lot sizes and shore setbacks considerably less than the Commission's standards. The Commission allows for continuation and, in some instances, modest expansion of these structures, but it strives to ensure that these uses do not have adverse impacts on the island or ocean environment. As the Commission revises its rules on nonconforming uses and structures, it will consider situations typical on islands.

Road setback requirements on islands also deserve reexamination. Many island roads are no more than unimproved byways or footpaths, and

even the more substantial roads see little motorized traffic. Requiring the usual setback in these instances may not be reasonable.

The Commission may also need to reexamine how its adjacency criterion is applied to islands. On mainland areas the distance between two developments might be viewed as small; on islands this same distance may exceed the diameter of the island. To avoid sprawl outside of island village areas, a very small adjacency threshold may be needed.

The goal of compact development itself may not be desirable on some islands, where a more dispersed settlement pattern is needed to avoid groundwater problems. Clustered development, often promoted by the Commission in waterfront areas, may be appropriate in some island settings but not in others.



Monhegan & Manana Islands

Cultural, Archaeological and Historical Resources

Human activity throughout LURC's jurisdiction has resulted, over time, in a variety of cultural resources. These resources possess educational, scientific and social values that help us understand our heritage and contribute to our sense of the state, and its North Woods, as a unique place. Cultural resources include Indian canoe routes, prehistoric archaeological sites, historic archaeological sites, and historical structures, districts, trails and landmarks.

Archaeological resources, both prehistoric and historic, provide us with evidence of human life and culture in past ages. Prehistoric archaeology attempts to reconstruct the lifestyle of the original human inhabitants of Maine from the end of the Ice Age to the arrival of the Europeans and written history. Historic archaeology analyzes the settlements and forts of the period from 1600 on, helping to expand the historical record. Historical resources in the form of structures, sites or landmarks are associated with past events or people of significance in the history of the state, represent an architectural style of a distinct period, or both. Criteria exist at both the federal and state level for evaluating the significance of such resources for placement on the National Register of Historic Places, *Maine's Historic Places, Maine's Archaeological Survey and the Statewide Historic Archaeological Inventory.*

Archaeological Resources

The first people known to inhabit Maine, the Paleoindians, moved in from the south or west about 11,000 years ago as the land area of Maine was recovering from its last glaciation. They tended to camp on very well-drained soils away from river valleys and were probably the only prehistoric people to have lived in such areas in Maine. Trees spread across Maine toward the end of the Paleoindian period, forcing subsequent inhabitants to live and travel along lakes, waterways and coastal areas.

Travel on the ocean, main rivers and major lakes in dugout canoes characterized the Archaic period between 10,000 and 3,000 years ago. Native American settlements concentrated at the inlets and outlets of major and medium-sized lakes, along the main river valleys, and in coastal sites. The development of the birchbark canoe sometime between 4,000 and 3,500 years ago opened up the Maine interior away from major lakes and rivers. Canoes enabled an increasingly dispersed settlement pattern around lakes and smaller streams during the late Archaic and Ceramic periods.

Native Americans in Maine began to construct and use pottery about 3,000 years ago. During the Ceramic period, from around 1000 B.C. to 1500 A.D., Native Americans developed a generalized hunting, fishing and gathering economy based upon the mobility of birchbark canoes. They combined subsistence and settlement strategies to move people to seasonally available resources, or to move food and other resources to population concentrations. Life over most of Maine remained based almost entirely upon harvesting wild resources until well after contact with Europeans.

When the first European explorers arrived in the 1500's, the Early Contact period began, marking the end of the prehistoric archaeological period in Maine. Contact with the explorers initially added European materials to Native material culture, followed later by other impacts upon Native life, including intensified fur trapping and trade, changes in intertribal networks, intermittent warfare, widespread disease, and eventually, significant loss of lands.

For most of prehistory, Maine Native Americans were hunter-gatherers. They were generally mobile in lifestyle and lived in relatively small groups. The largest communities consisted of several hundred individuals in villages which most of the population left at certain seasons.

Four types of archaeological sites are known to exist in Maine: (1) habitation and workshop sites; (2) lithic quarries; (3) cemeteries; and (4) rock art. There are hundreds of known prehistoric archaeological sites in the area under LURC jurisdiction, as well as hundreds more that are undiscovered since archaeological surveys have been done on less than 10% of the land area. Habitation and workshop sites comprise the vast majority (over 95%) of the known archaeological locations in Maine. They

exhibit evidence of a range of activities from food procurement and processing to tool manufacture and maintenance. More than 95% of these sites are located adjacent to canoe-navigable waters, whether coast, lake, river, stream or swamp, or former shorelines of the same. The majority of sites are shallowly buried on till, sand, gravel or silt soils within 1.5 feet of the surface. Some deeply buried sites, up to three meters in depth, occur in alluvial settings along rivers and streams.

The other types of known archaeological locations are far fewer in number than habitation sites. Lithic quarry sites are mines for rock used in making stone tools. They are highly localized sites, occurring at bedrock outcrops or along exposed, stony stream and river bottoms with extensive cobble materials. Cemetery sites always exist in locations with well drained sandy or gravelly-sand soils near a large or small river or lake shore, or within 100 yards of a major habitation site. Rock art sites occur immediately adjacent to canoe-navigable water on particular kinds of bedrock outcrops. They include both petroglyphs and pictographs and probably date within the last 2,000 years.

Examples of significant archaeological sites in LURC's jurisdiction include both prehistoric and historic habitation and workshop sites and prehistoric quarry sites. The Chase Lake-Munsungun Lake Archaeological District incorporates both prehistoric habitation and quarry sites, at least 18 of them, within 0.1 square kilometers centered on the Chase Lake Munsungun Lake thoroughfare. The sites range in elevation from lake level to the summits of adjacent hills, and in age from 11,000 year old Paleoindian occupations to 500-year-old Late Ceramic period campsites. The sites away from the lake are associated either with glacial outwash landforms, or with quarry outcrops of a high-quality chert. This area was investigated in the late 1970's by the University of Maine and listed on the National Register of Historic Places in 1979.

The Vail site in the Magalloway Valley near Lake Aziscohos in western Maine is an example of a large Paleoindian habitation site. It is surrounded by many smaller habitation sites, one with a stone meat cache, as well as two killing grounds. The sites occur on sandy soils and are associated with the valley, stream and a kettle hole. Following identification of Paleoindian tools in the collection of Francis Vail in the early 1980's, subsequent professional excavation of eight or nine locations recovered over 4,000 tools and a survey of most of the Magalloway Valley revealed at least eight more

Archaeological Dig near Aziscohos Lake

Chesuncook Village on Chesuncook Lake

sites. Prior to the identification of the killing grounds and stone cache, neither had been recorded east of the Mississippi River. The Vail site and associated killing ground are listed on the National Register as an individual site.

Historical and Cultural Resources

Shortly after European explorers came to Maine's coast in the 1500's, European settlers followed, stopping on coastal shores and islands for fishing and fur trading, and later turning to farming, shipbuilding, quarrying and timber harvesting. Settlement didn't begin in the interior of the mainland until around 1800, spreading inland from south to north. The earliest settlements depended upon subsistence agriculture and small scale timber harvesting.

Timber harvesting operations advanced eastward and northward from river to river, from the Saco to the Presumpscot, and then on to the Kennebec as far north as Moosehead Lake. The peak of the lumbering activity occurred along the Penobscot River during the 19th century, following the river's East and West Branches deep into the wildlands. Throughout the 18th and 19th centuries, timber was transported by oxen, horses, and water. Elaborate systems of dams, lakes, canals, rivers and booms were devised to control and facilitate log movement. Lumber camps were built to house loggers; farms were carved out of the wilderness to supply forage, bedding, produce, meat and shelter.

The opening of the Maine Woods to logging also opened the interior of Maine to other human activities during the 19th century. In addition to settlers, people came from the industrializing cities of the East Coast to vacation, exploring the forests, waterways, mountains and islands. Some stayed in expensive resorts like Kineo, Harfords Point and Seboomook; others chose simpler sporting camps offering guide services to the choicest hunting and fishing spots; still others came with their own canoes, tents and guidebooks to explore on their own. In any case, the Maine "wilderness" was on the map as a vacation and recreation destination.

The jurisdiction never became heavily populated, and by 1890, the population of the area had already peaked. Although new communities were settled, particularly in the northern part of the jurisdiction, the area as a whole was depopulating by

the turn of the century. That trend continued until 1970, when the population began to grow slowly.

The most well known historical resources in LURC jurisdiction relate to the early days of the timber industry and consist of canals, dams, railways, sluiceways, logging settlements and farms. Other resources include architecturally significant structures and districts, historical commercial sites, such as sporting camps, historical industrial sites, and military fortifications and artifacts.

One example of an historic archaeological period habitation and workshop site is a farm settlement established in northwestern Maine in the 1830's. It features a large farm which produced quantities of hay and grain to support logging operations in the area until about 1930. The site consists of two dwellings and several barns and outbuildings along with several other former farms and a depot along a river. This site is important by virtue of its early date for the region and its symbiotic relationship with the logging industry.

LURC Regulatory Approach

The Commission employs the Unusual Area Protection Subdistrict (P-UA) to protect important historic, scenic, scientific, recreational, aesthetic or water resources which have special land management requirements which cannot be met by another zone. This zone can be applied to historical, archaeological and other cultural sites and resources. The Commission protects a number of historical sites and trails through P-UA designation. These include Chesuncook Village, the Eagle Lake Tramway, Katahdin Iron Works, and the Monhegan Island Lighthouse area. Other protection subdistricts encompass additional resources: Northeast Carry and Penobscot Farm are in a Resource Plan Protection (P-RP) Subdistrict; Telos Canal is in a Recreation Protection (P-RR) Subdistrict.

Cultural, Archaeological and Historical Resource Issues

Significant archaeological sites and historical resources are eligible for listing on the National Register of Historic Places. Legally, significant archaeological sites are those worthy of protection or excavation with public funds. Criteria for eligibility include site age, content and condition. Sites must not be disturbed by human or natural forces, because the eligibility criteria specify that components of one period must be separable from those of another period, and that sites from the more recent archaeological periods must be at least partly intact.

Erosion, development, and vandalism can all destroy the significance of archaeological sites. The primary protection afforded these sites comes from identification so that they can be protected from threats or excavated by professionals.

At this time, erosion poses the greatest threat. Unfortunately, artificially raised water levels on many interior lakes, as well as natural land subsidence along the coast, have resulted in water covering or eroding many sites from the Archaic period to the present. The greatest source of material that survives erosion fairly intact tend to be those sites sealed in the stratified sediments of floodplains along the rivers. Development runs a close second to erosion as a threat to archaeological resources. Since most of the sites are shallowly buried and over 95% of the habitation and workshop sites occur along shorelines, any activity in shoreland areas that disturbs the top two feet of earth has the potential to severely damage a site. And finally, vandalism, caused by nonsystematic digging for artifacts, can destroy both site and artifacts. Vandalism usually takes the form of unauthorized excavations by artifact collectors who loot sites once locations are publicized. This has resulted in the legal restriction of public access to information concerning the location of known or potential archaeological resources.

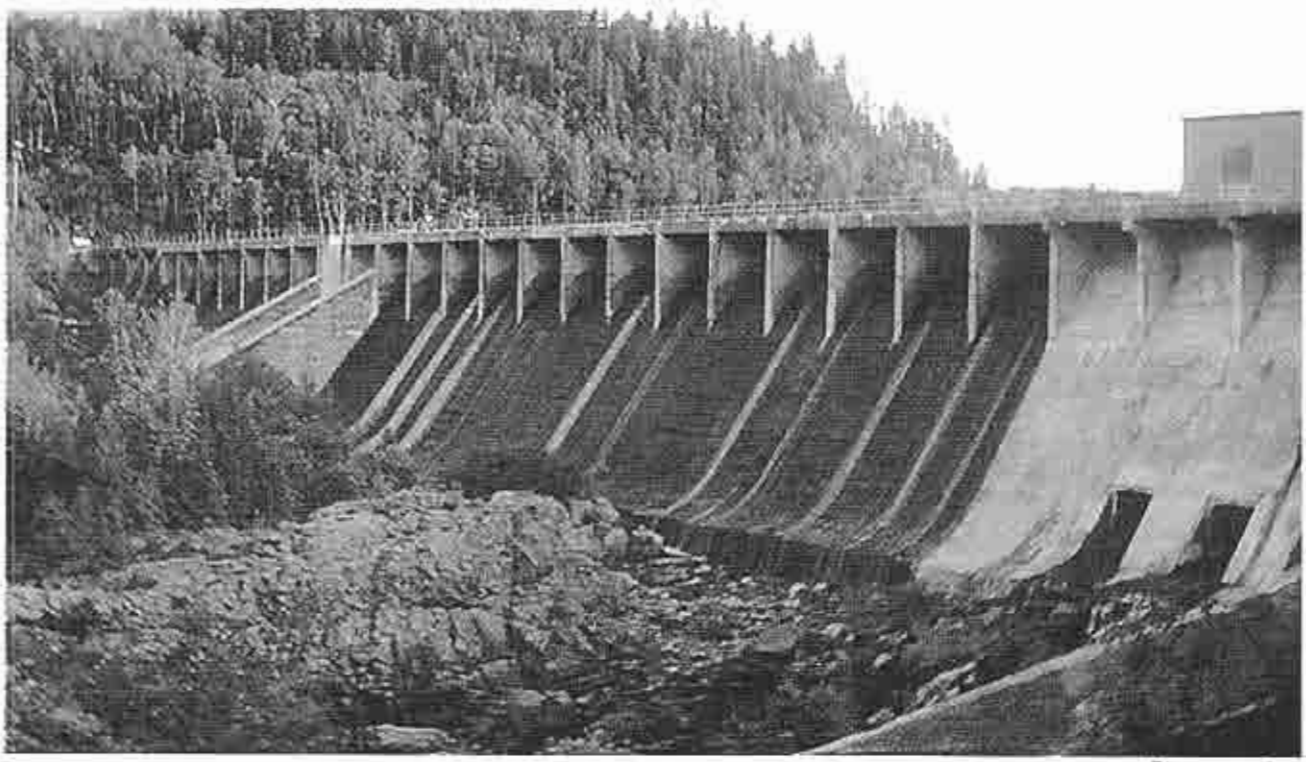
As with archaeological resources, a complete inventory of historical resources in the jurisdiction has not been made. Limited state and federal funds hinder efforts to identify the resources. That lack of information combined with the variety and low density of known sites, structures and trails scattered across the jurisdiction's millions of acres, often in remote locations, make it difficult to develop effective preservation strategies. Other problems involving known historical resources include inappropriate alterations which compromise architectural design and values, abandonment and deterioration of structures, and adjacent development which is incompatible with the historic context of a particular resource.

To date, LURC and the Maine Historic Preservation Commission have worked together to incorporate an assessment of the overall cultural significance of lakes into LURC's lake database. The assessment is based upon information on cultural features that have direct connections to lakes, evaluating those features listed on the National Register of Historic Places, in *Maine's Archaeological Survey,* the *Statewide Historic*

Archaeological Inventory and in *Above the Gravel Bar: Indian Canoe Routes in Maine.*

Currently, when the LURC staff reviews an application for a permit which the lakes database indicates is near a potentially significant archaeological or historical area or feature, the Maine Historic Preservation Commission (MHPC) receives a copy of the permit application and site plan for review and comment. However, of over 1,500 lakes contained in the database, only 10 to 15% have been surveyed to determine their archaeological potential. The significance of most sites has not been assessed at this time, giving the staff no indication whether or not the application may adversely affect significant cultural resources. Since the majority of sites are located within 300 to 400 yards of the shorelines of canoe-navigable waterbodies, protection efforts may be enhanced by considering whether criteria can be developed for determining when to request MHPC review of permit applications on lakes that have not yet been assessed.

Both agencies could strengthen their efforts to protect these cultural resources by further cooperation. The following needs warrant consideration: (1) a method for obtaining more information from MHPC on potential archaeological sites, without compromising confidentiality; (2) a strengthened process for assuring that all applications with potential impacts on significant archaeological or historical resources are being adequately reviewed; (3) criteria for identifying potential archaeological sites not located near shorelines; (4) an estimate of the costs of professional reconnaissance and survey activities, prior to requiring such an evaluation through LURC procedures; (5) an approach to dealing with architectural design issues for both clustered and isolated historical structures and/or sites which occur within the jurisdiction; and (6) joint efforts to obtain funding to further investigate the extensive areas of the jurisdiction not yet surveyed.



Ripogenus Dam

Energy Resources

The Commission's jurisdiction is host to a broad array of energy resources. Historically, Maine has depended heavily upon indigenous hydro and biomass resources for energy production. Today, these renewable resources continue to be valued and new energy resources are being discovered due to new technologies. These indigenous energy resources provide reasonably priced power and reduce the state's reliance on energy imports.

At present, hydropower, biomass, wind, and solar resources have the greatest potential to be significant contributors to Maine's energy mix. Other indigenous resources do not appear to have a significant role in the near-term, although technological and other developments may change this.

Energy Use

Energy use in Maine grew dramatically in the 1980's, driven largely by economic growth. During the 1980's, Maine's use of renewable resources (hydropower and wood) increased by almost 58%. This increase was due largely to a significant increase in the use of wood for generating electricity by cogeneration and independent power plants, resulting from concerns about rising oil costs and changes in federal policies early in the decade.

Energy use in Maine during the 1990's is not expected to grow at the 3.2% annual growth rate of the 1980's due to slower economic growth, higher energy prices, and continued conservation efforts. Slow but steady growth is expected over the long-term.

Hydropower

Hydropower accounts for approximately 30% of the state's utility, industrial and self-generated electricity. The State Planning Office estimates that untapped hydropower sources statewide could provide up to 297 megawatts of additional installed hydropower capacity, including improvements and upgrades of existing facilities, and new projects at sites where hydro development is not prohibited under the Maine Rivers Act.

Hydropower is reliable, renewable, and generally nonpolluting, although it does have potentially adverse environmental impacts such as oxygen depletion, impaired fish migration, and other impacts on the aquatic environment. In many cases, these adverse impacts can be mitigated to varying degrees.

A number of major new dam sites were considered during the 1980's. A proposal for a new dam at Big Ambejackmockamus Falls ("Big A") on the Penobscot River was approved by the Commission but failed to receive water quality certification from the Department of Environmental Protection (DEP) and has since been abandoned. At this time, no new dams or hydro projects are being considered in the jurisdiction. A large dam was approved by DEP at Basin Mills in Orono in 1994.

The focus in hydropower has shifted over the past decade from constructing new dams to relicensing existing dams. As with other indigenous energy resources, the future of hydropower will depend upon factors such as oil prices, utility avoided cost rates, the competitiveness of other energy alternatives, and the ability of specific projects to meet federal and state regulatory requirements.

Biomass

Prior to the 1980's, use of wood for energy in the jurisdiction was limited to a few cogeneration facilities producing electricity and process steam principally for their own use. During the 1980's, a small biomass power industry developed, comprised of 21 co-generation and free-standing plants capable of providing over 500 megawatts of generating capacity. Although none of these facilities is located in the jurisdiction, many are adjacent and utilize wood from the region.

The federal Public Utilities Regulatory Policy Act (PURPA), which took effect in 1980, created the opportunity for many of these new biomass plants. PURPA requires local utilities to purchase all power generated from renewable sources by nonutility power suppliers at a cost equal to their avoided costs. PURPA, combined with the high oil prices of the early 1980's, created a favorable environment for development of biomass plants. The resulting rate structure for biomass-generated energy, however, had the effect of producing artificially high

costs to consumers. Since the 1980's, low avoided costs and the surplus supply of electricity have curtailed interest in developing additional biomass plants.

In the 1990's, several biomass plants are running well below capacity or not at all, because electrical use has not met projected demand. Since biomass energy is one of the most expensive types of power, power companies cut back on this type of generation in times of surplus capacity.

The demand for wood biomass in the early 1990's was met by mill residues and whole tree chips produced from logging residues and stand thinnings. The future of biomass generation depends upon the long-term availability of wood fuel – which depends in part upon competing demands for wood – as well as the factors cited above that affect the viability of alternative energy sources.

Windpower

Windpower is the subject of considerable interest in Maine. Maine's wind resource is considerable, and much of it occurs along high mountain tops and ridges within the jurisdiction. These winds have the potential to power wind energy technologies that appear to compete with more traditional energy sources. To date, the Commission has reviewed one major windpower project located in the Boundary Mountains area.

Peat

The high oil prices of the 1970's and early 1980's and associated desire to decrease the state's dependence on oil led to consideration of peat as an energy resource. However, peat has not become a significant energy resource for a variety of reasons. Lower-than-expected oil prices have discouraged the development of alternative fuels; the logistics of extracting peat in northern climes have proved to be somewhat problematic; and society has moved toward greater protection of wetlands and their values.

The jurisdiction has considerable areas of peatland, although not all peatlands are appropriate for harvesting for fuel. Some support rare plant species and animal habitats or are otherwise ecologically or culturally valuable. Peatlands are discussed in the wetlands section of this plan.

At present, there is one peat burning facility in the jurisdiction. Down East Peat operates a peat mining facility in the organized town of Deblois and Township 16 MD. The facility initially harvested peat for agricultural and other uses, but in 1985, the company constructed a 12-megawatt electrical cogeneration facility in Deblois. The capacity of the cogeneration facility has since been increased to 25 megawatts, but the cogeneration plant has principally used fuels other than peat.

LURC Regulatory Approach

A number of protection zones are applied to resources that can be used for energy production, such as High Mountain Area Protection zones, Shoreland Protection zones, and Wetland Protection zones. In all of these cases, the focus of these zones is the resource, not the energy which can be produced from it.

The Commission addresses energy resources principally through the development review process when it evaluates proposals that involve energy production (eg. dams or wind towers) or the harvesting of fuel (eg. peat harvesting). The Commission is directed by a number of policies designed to guide the balancing act between utilization of the resource and other potentially conflicting public values.

Energy Resource Issues

Windpower

As a renewable form of energy, windpower offers an attractive alternative to the burning of fossil fuels. Large windpower installations, however, have the potential to conflict with other values of the jurisdiction, particularly those associated with mountain areas, the areas where wind power developers have focused their efforts to date. This issue is discussed in more detail in the Geologic Resources section.

Energy Planning

Utilization of energy resources often raises complicated questions about how to balance among potentially competing uses of a resource. Most energy projects have tangible benefits, but they may also impinge upon other uses of a resource or adversely affect a resource. In these cases, the Commission must balance these competing interests based on the needs and values of the jurisdiction as well as the state.

The Commission on Comprehensive Energy Planning, directed by the Legislature to make rec-

ommendations for a state energy policy, completed its work in 1992. This Commission noted that the state's energy policy should address the cost, reliability, environmental impact, and economic impact of energy projects. It stated that the goal of the state's energy policy should be to meet the state's energy needs with reliable energy supplies at the lowest possible cost, while at the same time ensuring that energy production is consistent with Maine's goals for a healthy environment and a vibrant economy. The Land Use Regulation Commission supports this goal and will try to advance it in its review of potential energy projects.

Forest Resources

Proportionately, Maine is the most heavily forested state in the nation, with 89% of its land area in forest. The Commission's jurisdiction is nearly 95% forested, making it even more extensively wooded than the state as a whole. The vastness of this forest resource contributes to the impression of the North Woods as a wild and remote place, one of the area's most distinctive characteristics. The forests offer a variety of opportunities and values, including timber harvesting, recreation, energy production, wildlife habitat, and watershed protection.

Maine's forest resources are vitally important to the state and New England – economically, culturally, and biologically. Economically, forest resources have supplied a continuous stream of raw materials for lumber, pulp, and paper production which have provided a stable economic base throughout the state's history. Today, this primary production remains a bulwark of the state's economy, increasingly supplemented by forest-based recreational industries. Culturally, the seemingly endless expanse of the forest is an integral part of Maine's heritage, a place where residents have earned their livelihoods, hunted and fished for both food and sport, and explored and recreated, alongside visitors "from away." Biologically, the forests provide genetic and ecosystem diversity, natural systems for counteracting air and water pollution, animal and plant habitats, and many other values.

Characteristics

The composition of Maine's forests is heavily influenced by three factors: extensive areas of thin, rocky, and poorly drained soils, intermixed with scattered areas of deeper, better-drained soils; a cool climate and abundant precipitation; and recurrent insect outbreaks. Situated between the eastern boreal forest and the temperate deciduous forest, much of Maine lies in an ecological transitional zone referred to as the Acadian forest. A mixture of hardwoods and softwoods comprise the forest, changing in composition as one moves to higher elevations and north and east. The subboreal Acadian forest occurs more in northern and eastern portions of the state and tends to be dominated by spruce, fir and other softwoods.

Maine is endowed with approximately 17.6 million acres of forestland statewide; 17.1 million acres are considered timberland and the other half million acres are in parks and wildlife preserves. Softwoods comprise approximately 7.8 million acres of woodland; hardwoods, 6.7 million acres; and mixed woods, 3.1 million acres. The principal softwoods found in Maine are spruce, fir, white pine, cedar, tamarack, and hemlock; the principal hardwoods are maple, birch, beech, oak, ash, and aspen. LURC's jurisdiction encompasses over half of the forestland in Maine, 9.5 million acres, and includes much of the state's spruce-fir forest.

Most of the information about Maine's forest resources comes from inventories that assess the nation's wood supply, conducted by the U.S. Forest Service. The federal agency completed the most recent federal inventory in 1980, and another is underway with the results due in 1996. To fill in the gap, the Maine Forest Service (MFS) undertook an assessment of Maine's wood supply and published its findings in 1993.

Compared with the results of past surveys, MFS's Assessment found a decline in the growing stock volumes of spruce and fir. (Growing stock is defined by MFS as larger trees, 5 inches diameter at breast height or more, of sufficiently high quality that 50% of the tree can be used for pulpwood or a higher value product.) MFS attributes much of this decline to mortality and reduced growth rates

associated with budworm damage and harvest rates. The growing stock volumes of other softwoods, principally hemlock, white pine, and cedar, are stable or increasing. According to the Assessment, the quality of the softwood resource has improved based on the percentage of potential sawlog wood that is actually sawlog quality.

The spruce budworm has had a major impact on the forest over the past century, recurring cyclically every 60 or so years, concurrent with the maturation of large volumes of balsam fir. The forest resource was affected by a major outbreak of spruce budworm which lasted from the early 1970's to the mid-1980's. This outbreak damaged or killed millions of trees, prompting premature harvest of many stands. The forest is still recovering to pre-outbreak rates of growth. As a result of this and prior outbreaks, the spruce fir forest demonstrates an age-class imbalance. Young trees of these species are abundant, but larger trees will be scarcer for the next 20 or so years.

Hardwood growing stock volumes have generally remained stable since inventories were first begun 30 years ago. However, MFS's Assessment indicates a decline in the quality of the hardwood resource since the 1960's and suggests that high grading – the practice of removing only the best trees and leaving lower quality trees behind – may be the cause.

Ownership

Maine has the largest proportion of industrial forestland ownership of any state in the nation. Statewide, nearly 95% of the forestland is privately owned, with land management and pulp and paper companies owning and controlling a large portion of it. Most of the industrial forestland ownership in the state is within the Commission's jurisdiction.

Industrial owners generally own forestland and wood processing facilities, usually pulp mills or sawmills. Nonindustrial owners usually manage land for timber but do not own wood processing facilities. Small, nonindustrial owners generally do not manage their land as a full-time endeavor.

Information from the Maine State Bureau of Taxation on ownership patterns in the unorganized townships is shown in the following table. The 40 plantations and organized towns within LURC jurisdiction, for which statistics on ownership are not readily available, generally have more landowners and more fragmented ownership patterns than unorganized townships. Therefore, the figures for all of LURC jurisdiction are likely to be considerably higher, particularly in the smaller categories of ownership.

It is estimated that, for townships whose status has not changed since 1971 (for example, by organizing to a plantation or town form of government, or conversely, deorganizing), the number of landowners with landholdings less than 500 acres in size has increased from 5,500 to approximately 8,400 – a 53% increase.

Leasing of land is a common practice in the jurisdiction and is not reflected in the above numbers. Leases are most commonly used for relatively small recreational lots. Approximately 5,600 leases were held in the unorganized townships in 1991.

Forest Use

Traditionally, Maine's forests have supported wood products industries that are vital to the economies of surrounding communities as well as the state, and provided the environment for many nontimber, forest-based activities, such as recreation. The past two decades have seen increasing diversity in the use and value of Maine's forest resources, as well as growing intensity of use. The forest industry, the dominant landowner and user of the forest resource, and some other industries have contributed to this trend through more intensive forest management, increased use of hardwoods, construction of biomass plants, and evaluation of lands for purposes other than timber production, such as windpower, mining, and other forms of resource development. Concurrently, the forest resource has experienced increasing use for recreation, including a number of new forms of recreation, and growing interest in its biodiversity.

Forest Industry

Timber harvesting, originally for lumber, and later for pulp and paper production, has long been the major use of Maine's forest. Today, the forest provides raw material for pulp and paper, lumber, and other forest products, and the forest industry is the largest single contributor to Maine's economy. Wood is typically harvested by independent logging contractors and used by one of the following: the paper industry, comprised of a small number of large companies; the lumber industry, comprised of a large number of small firms; or by wood products manufacturing entities, of which there are 200 to 300 in the state. Forest products constitutes 44%

LANDOWNERSHIP IN UNORGANIZED TOWNSHIPS -1991

Size of ownership	No. of Landowners	No. of Parcels	Total acreage
< 1 ac.	3,519	4,474	2,247
> 1 - 10 ac.	2,769	3,439	11,946
> 10 - <40 ac.	1,092	1,517	33,423
40 - <500 ac.	1,926	2,674	287,026
500 - 1,000 ac.	67	241	178,340
> 1,000 - < 5,000 ac.	63	242	591,062
> 5,000 ac.	68	533	8,098,784
TOTAL	9,504	13,120	9,202,828

Source: Maine State Bureau of Taxation data; compiled by LURC staff.

Notes: (1) Does not include ownership data for plantations and towns in LURC jurisdiction;

(2) Does not reflect the approximately 5,600 leases in these areas.

(3) Bureau of Taxation practice of combining contiguous parcels in the same ownership may underrepresent the number of parcels.

(4) The practice of holding land in common, undivided ownerships may result in some overrepresentation of the number of landowners and the number of parcels, principally in the larger acreage categories.

of the total value of all products manufactured in the state. Paper, lumber, and wood products industries employ 8% of all Maine workers, but account for 35% of total payroll in the state, making it clear that a vigorous and healthy forest contributes significantly to the well-being of Maine's economy. The forest products economy relies heavily upon wood coming from areas within LURC jurisdiction.

Spruce and fir dominated the forest products industry for years, but their importance as measured in terms of percentage of the harvest has decreased. Starting in the 1980's, there has been a major shift away from use of spruce and fir and toward hardwood as a source of pulpwood. Today, more hardwood than softwood is harvested in Maine to make paper. The decline in use of spruce and fir pulpwood is attributed to its rising cost and concerns over its long-term supply. Sawlog production of spruce and fir has expanded, but overall harvest levels have dropped concurrent with significant increases in the use of other species. Trees of sawlog size will become scarcer for the next 20 or so years. This shortage has been predicted for some time, although its specific length and severity remain uncertain. The declining use of softwood in pulp production and increased management of young spruce and fir stands to improve productivity may help to alleviate future shortfalls.

While utilization of hardwood has increased, the management difficulty remains the lack of regional pulpwood markets. Without markets for low-quality hardwood, hardwood quality may continue to decline if low-quality trees are left in the woods.

In the 1980's, biomass energy emerged as a new use of wood. Wood-using industries have traditionally used waste wood to generate heat or steam, but not on a large scale. No biomass facilities are located in LURC jurisdiction, but many are adjacent and utilize wood from the jurisdiction. In 1990, these plants consumed four million tons of wood fuel, 40% of which was mill residue. The

Harvesting near Trout Pond

remaining 60% was generated by integrated logging jobs and came from harvest residues, poor quality hardwood, noncommercial species, and products of pre-commercial thinnings.

Establishment of Forest Practices legislation in 1990, administered by the Maine Forest Service, has affected use of the forest. The original legislation provided for increased technical assistance to forest landowners, establishment of a clearinghouse for information about forest management, improved forest management activity reporting, and development of rules regarding forest regeneration and clearcutting. The increased technical assistance, however, was never provided due to lack of funding. The rules enable better tracking of forest utilization by requiring notification of intent to harvest commercial forest products for sale and reporting of products (volume) harvested. They also establish standards pertaining to clearcutting and regeneration. The rules define clearcuts based on basal area per acre of trees of acceptable quality and species and regeneration standards. Areas of nonclearcut land must be left adjacent to clearcut land, the specific standards varying based on clearcut size. Clearcuts as defined in the law are prohibited.

Maine's forest resources may be affected by nationwide changes in wood supply and demand. Reduced harvest levels in the Northwest may precipitate increased demand for wood from the northeast. This trend may be further accentuated if the U.S. Forest Service decides to eliminate below cost timber sales on National Forestland.

In the foreseeable future, timber production will continue to be the most significant economic use of the forest resource in the jurisdiction, but other uses continue to be explored. A number of new uses of the forestland base have surfaced in the past decade, such as windpower and mining. The value of land for development has also increased, particularly near shorelines and scenic places, due to heightened demand for recreational homes.

Recreation

Recreation has long been a common and popular use of the Maine Woods, and the state

Bowater's gate near Seboomook Lake

enjoys a longstanding tradition of public recreational use of privately-owned land. Historically, these uses have been low impact, dispersed activities which were generally compatible with the forest resource and its use for fiber production. More information on recreation and associated issues is provided in the Recreational Resources section of this plan.

Other Values of the Forest

While uses of the forest resource have diversified and to some degree intensified, appreciation of the resource's value independent of its economic and other uses has also grown. Biological diversity, or biodiversity, is a new, emerging value associated with the forest resource. Biodiversity refers to all forms of life (animals, plants, and microorganisms) at all levels of organization (genes, species, and ecosystems). There is increasing interest in maintaining a diversity of species and ecosystems across the landscape to preserve genetic diversity and important functions played by natural systems.

The northern forest maintains biodiversity through the different types of ecosystems it encompasses, ranging from forested wetlands to upland forests; the many species of animals, plants and microorganisms that make up the ecosystems; and the multitude of genes that comprise the organisms. Some advocates of biodiversity are concerned that timber harvesting practiced on a large scale disrupts ecosystems and reduces biological diversity. Impacts depend upon the following factors: the size of the disturbed area; the size, shape and distribution of undisturbed fragments and the extent to which they are interconnected; the presence of undisturbed habitat to serve as source pools for recolonization of disturbed areas; and the amount of time allowed for the disturbed areas to recover.

Since it is logistically impossible as well as impractical to attempt to conserve each element of these systems individually, the trend in maintaining biodiversity involves protection of a representative array of ecosystems well-distributed across the landscape. New approaches to forest management have been proposed which incorporate this

and other concepts designed to maintain substantial levels of wood production while preserving biological diversity. While many of these approaches remain theoretical, trials of some have begun in Maine.

The Maine Council on Sustainable Forest Management, created by the Governor in 1995, is a complementary effort. Tasked with developing "practical, credible benchmarks of sustainability against which forest landowners can assess their forest management practices," the Council has the potential to influence the future biological productivity and diversity of Maine's forests. The Forest Biodiversity Project is a similar effort, initiated in 1994 by public and private landowners, the scientific community, and conservationists to protect biological diversity on Maine's forest lands.

LURC Regulatory Approach

Reasonable regulation of forest practices in environmentally sensitive areas is a high priority of the Commission. The purpose of this regulation is to minimize adverse effects on water quality, fisheries, wildlife, and aesthetic and recreational values while allowing for economic utilization of the forest resource.

The Commission's regulation of timber harvesting and related uses is statutorily limited to zoned protection and development subdistricts, although the statute requires land management roads in management subdistricts to be built and maintained according to road guidelines adopted by the Commission. In most protection zones, the Commission prescribes specific performance standards for harvesting and road-building activities in order to preserve water quality, recreational, and aesthetic values. Where landowners have reason to exceed these standards, they may apply for a permit from the Commission to do so. A permit is required for all harvesting and related activities in zoned development subdistricts.

The most common zoning designation of forestland is the General Management (M-GN) Subdistrict. The General Management zone is intended to enable forestry and agriculture to occur with minimal interference from unrelated development in areas where the resource protection afforded by protection subdistricts is not necessary.

The Commission's standards establish two other management subdistricts which are appropriate for forestland: the Natural Character (M-NC) and Highly Productive (M-HP) Management zones. Neither of these zones have been used yet.

The Natural Character Management zone was designed to maintain the character of certain large undeveloped areas of the jurisdiction and to promote their use primarily for forest and agricultural management activities and primitive recreation. As in the M-GN zone, forest management, including land management roads, is exempt from regulation in the M-NC zone. But whereas the M-GN zone allows residential dwellings of any size, M-NC zones require dwellings to meet the criteria for remote camps, which includes a building size limitation and a prohibition on utilities. Campgrounds, mineral extraction, buildings relating to forestry and agricultural management are allowed in the district, and public utilities are allowed by special exception.

The Highly Productive zone was designed to prevent highly productive agricultural and forestlands from being lost to other incompatible uses. This zone has not been applied to forestland due to the difficulty of defining qualifying lands, but the Commission remains committed to maintaining prime and other important agricultural and forestlands.

A considerable amount of forestland, about 185,000 acres, is in the Fish and Wildlife Protection (P-FW) Subdistrict because it provides habitat for wintering deer. The deeryard protection program is discussed in greater detail in the section on Fish and Wildlife Resources.

The Commission's approach to forestry regulation is perhaps unique in the United States. Tailored to the circumstances of the jurisdiction, this framework provides protection in sensitive areas while allowing for a substantial degree of discretion and flexibility by landowners in managing the bulk of their land for timber production.

The overall approach to zoning of forestland is sound, but there continue to be issues which bear attention. As areas in the General Management (M-GN) Subdistrict continue to be rezoned to development, the M-GN zone has come to be viewed by some as a holding zone for land that is appropriate for conversion to other uses. One approach to addressing this trend is to consider measures which will limit conversion of land most appropriate for resource-based uses and direct development away from these areas.

Forest Resource Issues

The extensive forest resource of the jurisdiction has many diverse values, ranging from timber production to recreation to remoteness. In many

Lots for sale

ways, this resource has been maintained by circumstances of ownership, access, and other factors. These circumstances were likely as important as LURC policies in determining how the forest has been used. Recent decades have brought changes which may reduce this de facto protection of the forest and its myriad values.

As the Northern Forest Lands Council stated in its final report, "The conditions which up to now have conserved the Northern Forest can no longer ensure its perpetuation. The forces for change and current problems... may be stronger or weaker depending on economic cycles, but over the long run they will bring about change that, if left to proceed on its own, is likely to damage both the forest and the people who live there."

Fragmentation of Forest Ownership

A potential threat to forest resources is fragmentation of forest ownership and associated changes in use and management of the forest. Fragmentation of forest ownership is used here to describe land sales that incrementally result in forestlands comprised of smaller lots and more owners.

Many of the jurisdiction's values are closely linked to forest resources, including large-scale commercial forestry, ecological diversity, and recreation in a remote setting. Stability of ownership and dominance of large, landscape-scale parcels are most compatible with these values. Fragmentation of ownership and associated changes in use and management threaten to undermine the integrity of the forest resource in a way that compromises these values.

An unprecedented amount of forestland changed hands during the 1980's. Some of the transactions involved large landholdings, such as the Diamond Occidental lands, and the Great Northern lands (sold twice in a three-year period). These land transactions were unsettling to many because they came at a time when forestland was being viewed, for the first time, as an increasingly valuable commodity for nonforestry uses. Much of this land was ultimately purchased for forestry use – the Great Northern lands, for example – but some of these transactions have resulted in the sale of lands for recreational lots. Portions of the Diamond lands have been sold for these purposes. Ultimately, the large amount of acreage changing hands and increasing use of land for development

in parts of the jurisdiction shook the traditional vision of the region as an area of stable ownership and land use patterns.

The North Woods have experienced periods of active land trading and speculation in the past, but this trading has always involved large parcels of land. More recent land transactions have included the creation of many smaller parcels, making size a potentially limiting factor in the future use of these lands for forest management purposes.

Between 1971 and 1991, the number of landowners owning less than 500 acres increased significantly and an estimated 193,000 acres of land were subdivided from large ownerships into largelots (40 to 500 acres). In 1991, there were nearly 4,200 lots of between 10 and 500 acres, totalling 320,000 acres, within the unorganized townships (i.e. not including the 40 plantations and organized towns also within LURC's jurisdiction).

As lot sizes decrease, the likelihood that owners will manage land for commercial forestry decreases. Some parcels become too small to operate commercially, and some small landowners are not interested in commercial forest harvesting. When small parcels are managed for timber, productivity typically declines between 33% and 66% due to the lack or discontinuity of sound forest management practices.

A 1991 survey of small woodland owners in Maine confirms this notion, finding that respondents with more woodland acres were more likely to harvest timber for sale and to follow a plan or schedule for growing and harvesting timber. This leads to the complementary conclusion that smaller ownerships are less likely to be actively managed for timber. In short, as ownership becomes increasingly fragmented and parcel sizes decrease, some land is effectively removed from commercial timber production and productivity is reduced on others.

It is estimated that at least 56,000 to 105,000 acres of forestland have been removed from commercial forest management since LURC was established. While this amount is small in relation to the total amount of land remaining in forest management, it is a noteworthy trend. Maine's volume of spruce, fir, and quality hardwood has declined, and with future demand likely to be high, loss of forestland for timber production and reductions in productivity are a legitimate concern.

Of equal concern is that land divided into smaller lots becomes more ripe for development – whether that is the original intent of the division or not. The 1980's demonstrated that there is a high level of interest in seasonal housing in remote regions of the state. Demographics, changes in recreational preferences, and improvements in the economy will likely increase the demand for residential and recreational lots. This interest, and the resulting disparity between the value of land for forestry and its value for development, will continue to serve as an powerful economic incentive for converting high value lands to development.

While is olated hunting camps have coexisted with forestry for many years, more broad-based residential development is not as compatible with industrial forest activities such as aerial spraying and heavy truck transport on logging roads. New residential areas within or near commercial forestlands increase the potential for conflicts between uses. The term "shadow conversion" is used to describe the effect residential development tends to have on adjacent woodlands, often forcing commercial forest activities to be curtailed or modified.

In the past, landowner objectives and the market have limited land conversion in the heart of the jurisdiction as much or more than LURC policies. Many large landowners have chosen not to pursue development on their lands because of tax policies, potential for conflicts of uses, and other disincentives. However, times have changed, as have landowners and their objectives, tax policies, and other factors influencing land use patterns. These factors should not be relied on to preserve the traditional form of the forest and associated values.

There is continuing debate regarding the extent of fragmentation that has taken place and the degree to which it poses a threat. The Commission believes that in selected areas, fragmentation of ownership has negatively affected forest productivity and resulted in some undesirable development. But the Commission's primary concern is the longer-term threat posed by a continuation of this trend, and the Commission believes that now is the time to address this issue with clear policies and actions.

The Commission's goal is to maintain the forest resource in a way that preserves its important values, including large-scale commercial forestry, ecological diversity, and recreation in a remote setting. It will pursue this goal on several fronts. As outlined in greater detail in Chapter 4, the Commission proposes to seek legislative reconsideration of the statutory exemption for 40-acre lots to

eliminate its use for development purposes. It also proposes new development policies to guide future growth to appropriate areas, with specific implementation measures to be developed through a collaborative effort. Finally, the Commission will seek to encourage conservation of select areas of the jurisdiction that are particularly representative of the jurisdiction's principal values and, overall, are especially valued for their remote and relatively undeveloped condition.

Conflicts Between Uses

As use and ownership of the forest diversifies, the potential for conflicts between uses increases. Each user group has different, sometimes conflicting ideas of how the forest resource should be used. Those pursuing recreational development may object to certain forest management practices; those pursuing low-impact recreation may object to the use of the forest for more intensive recreational development.

The M-GN zone, as presently structured, assumes that many activities can co-exist without adversely affecting each other or the forest resource. The effectiveness of the zone will be reexamined in light of the increasingly diverse and intensive uses of the forest. For this reexamination, the Commission will formulate a strategy for identifying what uses are most compatible with the district's primary purpose – permitting forestry and agricultural management activities with minimal interference. The Commission will identify recreation activities that are compatible with forestry and other traditional uses and promote those in the North Woods. Development which commits land irrevocably to other uses and detracts from the forest resource will be directed to locations where it will not significantly affect this valuable economic and recreational resource. Management for multiple use, which calls for the most judicious use of the resource for a variety of compatible purposes, will be encouraged whenever possible.

Insect and Disease Outbreaks

Maine's forest resources have been affected by outbreaks of insects and diseases as long as they have existed. While the recurring spruce budworm is the most obvious example, other, less predictable natural threats also have noteworthy effects, such as the beech fungus and the hemlock

looper. The Commission developed a number of specific responses to the spruce budworm outbreak of the 1970's and 1980's. The Commission may draw upon these responses in the future as needed to address future natural threats that cannot be predicted.

3

Forest Practices

LURC's forestry standards have proven to be generally sound, but problems have arisen in the practical administration of some of the Commission's standards. In 1984, the Commission established a Forestry Issues Committee to review LURC's forestry regulations and to recommend possible improvements to them. Overall, the Committee found the Commission's forestry regulations to be fundamentally sound, but made a number of recommendations. Some of the recommendations have been implemented. The small streams mapping project was completed, in which additional small streams were mapped using aerial photography and information provided by landowners that wished to participate. LURC road and water crossing standards were revised to clarify which engineering formulae are acceptable for sizing culverts and bridges. Also, enforcement of the Commission's standards has improved dramatically due to the establishment of regional field offices, an increase in LURC enforcement personnel, and adoption of joint enforcement agreements with other agencies, including the Maine Forest Service.

A number of recommendations have not been implemented, in most cases because they involve complex technical or scientific issues which have not been easy to resolve. Many of these issues revolve around the technical capability to evaluate the impact of timber harvesting on water quality. Despite efforts to work with the academic community on these issues, practical approaches to monitoring and evaluating water quality remain elusive. Nonetheless, the enforcement staff has found ways to fairly evaluate impacts on water quality and effectively enforce LURC standards designed to protect valuable natural resources. The Commission will continue to consider the Forestry Issues Committee's recommendations in the context of changing circumstances and priorities and will take action to implement them as needed.

The Commission monitors a number of forest practices issues including the effects of forest practices on water quality and recreation; the possible long-term ecological effects resulting from pesticide and herbicide applications; the effects of large harvesting machinery on soil compaction and erosion; the effects of whole tree utilization on soil nutrients and subsequent tree growth; the impacts of increased accessibility to previously remote and fragile areas; and the effects of forest practices on wildlife habitats, steep slopes and high mountain areas. The Commission will continue to monitor these issues and adhere to a course of reasonable regulation in a manner consistent with its statutory mandate in order to prevent undue adverse impacts of forestry practices.

Sludge Spreading

Toward the end of the 1980's, the practice of landspreading paper mill sludge began to increase as a more economical alternative to landfilling the material. As the practice increased, so did public concern over the possibility that landspreading might adversely affect ground and surface water, wildlife, and other natural resources. Limited research has been undertaken on the effects of landspreading paper mill sludge.

A considerable amount of the landspreading of paper mill sludge takes place in LURC jurisdiction. Following a public hearing on this issue, in 1989 the Commission adopted rule changes which allow land application of residuals in Management districts without a LURC permit, provided such land application complies with the regulations of the Department of Environmental Protection (DEP). The Commission adopted these rule changes with the understanding that it will reconsider the issue upon conclusion of a "Comprehensive Research Program" on land application of residuals. DEP required industry to undertake this research program as a condition of its landspreading permits and established a Research Advisory Committee to review the research, ensure that it met the highest scientific standards, and was complete, unbiased, and verifiable.

The sludge research program has not produced usable results and the Research Advisory Committee dissolved due to dissatisfaction with the research program's methods and progress. DEP continues to review applications to landspread residuals under its regulations in the absence of comprehensive information about the environmental and public health risks posed by repeated, long-term applications of sludge to the same forestland and farmland. The Commission is concerned about the scientific uncertainty surrounding the effects of this practice, especially since most landspreading occurs on forestland within its juris-

diction. Consequently, it will continue to advocate more study of the issue and will consider limiting this practice if it appears that potential risks cannot be controlled and the risks associated with this practice clearly outweigh the benefits.

Other Policy Initiatives

Northern Forest Lands Study

In 1990, Congress established the Northern Forest Lands Council to seek ways for Maine, New Hampshire, Vermont, and New York to maintain the "traditional patterns of land ownership and use" of the Northern Forests. Following extensive study, the Council determined that the conditions which have conserved the Northern Forest in the past can no longer be relied upon to ensure its perpetuation. In its final report, the council identified a number of problems and forces for change that are affecting the Northern Forest, including:

- Rising taxes, causing loss of land from natural resource uses.
- Pressure for development of high-value areas near shorelines and scenic places.
- Jobs lost to competition from other regions and countries, and, thus, taken away from the north country.
- Incomplete knowledge of land management techniques to maintain or enhance biological resource diversity.
- Lack of funding and clear priority-setting for public land and easement acquisition.
- Insufficient attention to and funding for public land management.
- Fear of losing public recreational opportunities and access to private lands.
- Failure to consider forestland as a whole, as an integrated landscape.
- Increased polarization among forest user groups.

The Council proposed a strategy that focuses on strengthening the forest-based economy, fostering long-term stewardship of private land, allowing for public acquisition of land with exceptional public values where those values are threatened, and enhancing management of public land. The Council's major recommendations include:

- Changing local, state, and federal tax policies to encourage long-term ownership and management, in particular property taxes, estate taxes, capital gains taxes, and passive loss rules.
- Stronger support for public land acquisition and management that incorporates a careful planning process, and consideration of other tools to protect important public values.
- Encouraging assessment of the status of biodiversity in each state and development of a process for conserving and enhancing biodiversity across the landscape.
- Stronger support for public and private initiatives that enable landowners to keep their land open and available for recreation, including a federal excise tax on recreation equipment to help fund these programs.
- Further study of forest practices and appropriate action to promote sound forest management practices.
- More technical and financial assistance for private landowners interested in allowing public use of their land for recreation and noncommodity use.
- Stronger support, in the form of increased funding and educational and technical assistance, for wood products market development, and rural development related to forestry.
- Review of government regulations to promote simplification and stabilization of the regulatory process.
- Improved information-gathering, particularly that pertaining to identification of land conversion trends.

One specific recommendation regarding land use planning is noteworthy: "Agencies and organizations involved with land use planning should review their existing programs and plans. They should assess them for adequacy in guiding development to appropriate areas, and in supporting traditional uses of the forest."

The Commission is generally supportive of these recommendations as they are complementary of the Commission's goals and policies contained herein.

Geologic and Mountain Resources

Every Maine landscape, from the rocky coast to the heights of Mount Katahdin, is the product of a complex geologic history that spans millions of years. Cycles of weathering, erosion, and deposition, interrupted by episodes of mountain building, volcanic activity, and glacial sculpting have left behind an intriguing and distinctive landscape comprised of bedrock formations and surficial deposits that are an important part of the state's natural resource base.

Maine's landscape generally reflects the shape of the underlying bedrock. Bedrock usually lies within 20 feet of the land surface and provides the skeletal framework of hills and valleys, while the more recent history of glaciation is responsible for most subtleties of the landscape.

Most areas within the Commission's jurisdiction fall into one of four physiographic regions: Mountain Uplands, Downeast Mountains, Central Uplands, and the Northern region. The Mountain Upland region stretches from the state's western border to Mount Katahdin; the Downeast Mountain region lies just inland from the coast and is distinguished by prominent, rounded, granite peaks; the Central Uplands region is bounded on the south by the Downeast Mountains and to the north by the Mountain Upland region and is distinguished by rolling terrain with relatively little elevation change; the Northern region lies in the northwest corner of the state, and is marked by hills and some low mountains. Elevations throughout the jurisdiction are generally greater than 500 feet except along the coast and in the major river valleys.

Characteristics

Bedrock Resources

In geologic terms, Maine is relatively quiet now. The state is distant from sites of tectonic activity which are distinguished by volcanoes, earth-

Examining 400 million year old fossils

quakes, and other geologic events. Some earthquakes do occur along fault and shear zones in the bedrock, but most are too small to be felt or damage property. Widespread regional uplifting has created fractures and joints in bedrock which store groundwater, sometimes in significant quantities.

Bedrock in Maine has been through several periods of intense deformation and mountain building, and is mostly igneous or metamorphic in origin. Igneous rock formations, those formed from molten material, are located in two broad belts. One extends from the Sebago Lake region north to Rangeley, then northeast to Houlton. The other belt runs from an area southeast of Penobscot Bay to Eastport. Elsewhere within the jurisdiction, metamorphosed shales and sandstones are the predominant bedrock type. Metamorphic rocks have been altered by extreme heat and pressure, which cause minerals to recrystallize, usually forming harder, more durable rocks. Both metamorphic and igneous rocks are generally resistant to chemical weathering.

Unusual geological features were inventoried as part of the Commission's Wildland Lakes Assessment in 1987. The inventory contains information on physical features that are: (1) a type locality or rare occurrence; (2) critical to the interpretation and understanding of the geology of a region; or (3) an outstanding example of a particular feature. Bedrock features surveyed include significant outcrops, cliffs, caves, and waterfalls. While this inventory is impressive, it is not comprehensive; it only identifies features located within 250 feet of a lake or which dominate the view from a lake.

Bedrock sometimes provides a valuable record of the early development of life through fossils – the remains, trace, or imprint of a plant or animal that has been preserved in the earth's crust. Most of Maine's fossil sites are in the northern part of the state, associated with rocks that have not been affected by metamorphism.

Surficial Resources

The most recent major influence on the shape of Maine's landscape is the glacial activity that occurred between 25,000 and 10,000 years ago. During this period, the Laurentide ice sheet advanced into and receded from the region. The topography of the jurisdiction today is a direct result of this glacial activity. The glaciers scraped the soil off of the landscape, chipped away at the underlying bedrock, transported rock debris for miles, and deposited quantities of sand, gravel, and other unconsolidated sediments as they receded, creating new landforms and subtly altering the landscape.

Drumlins are elongated hills formed from compact glacial sediment that was plastered to the earth by the pressure of the overlying ice. Eskers are sand and gravel deposits left by meltwater streams in tunnels within the glacier. They form narrow, winding hills across the landscape. Some of Maine's esker systems are among the longest in the country – up to 100 miles long. Glaciation also created thousands of lakes and ponds as water collected in kettleholes left by blocks of ice and behind dams of glacial debris.

Flowing water deposited sorted sands and gravels, many of which form aquifers that store large quantities of groundwater. Elsewhere, the receding glacier deposited till, an unsorted mixture of sand, silt, clay, and rocks. As the ice sheets melted, sea level rose, flooding major river valleys and lowlands as far inland as Bingham and Millinocket. The sea subsequently receded to its present location, but its inundation of these areas resulted in widespread deposition of marine silt and clay.

Unusual geological features inventoried as part of the Commission's Wildland Lakes Assessment included surficial geologic features such as sand beaches, reverse deltas, moraines, kettleholes, boulder trains, and exceptional lake depth. Again, while impressive, this inventory is not comprehensive; it only identifies features located within 250 feet of a lake.

The Maine Geological Survey has mapped high-yield sand and gravel aquifers in portions of the jurisdiction. The only areas not yet mapped are north and west of Moosehead Lake, including the northern two-thirds of Piscataquis County and northwest portions of Aroostook County. The Sand and Gravel Aquifer maps depict known deposits of coarse-grained material that, in all probability, can supply useful quantities of groundwater. The maps are best used to locate sites favorable for development of water supplies and to identify areas poorly suited for activities that have the potential to degrade groundwater, including storage or disposal of hazardous and other waste.

Soil Resources

Soils are the product of thousands of years of physical and chemical weathering of bedrock and surficial deposits such as glacial till, outwash, and

marine and lake sediments. Soil formation is influenced by climate, particularly temperature and precipitation, living organisms, type of parent material, topography, and time.

Soils in Maine have developed primarily on glacial, marine, and alluvial deposits overlying bedrock. Much of the parent material is till, an unsorted mixture of clay, sand, and broken rock which is usually similar in composition to the underlying bedrock. Soils in Maine are predominantly shallow, stony, sandy to silty glacial tills which are acidic. Soil types in the jurisdiction vary widely, ranging from excessively drained gravels to very poorly drained swamps and bogs. The majority of soils are classified as Spodosols or Inceptisols, in which iron, aluminum and organic materials have been leached from the upper layers of soil. Many soil types found in the jurisdiction are inappropriate for most forms of development because of slope or shallowness to bedrock or wetness.

The Soil Conservation Service (SCS) maps soils at two different intensity levels in areas within LURC jurisdiction. In forested areas, SCS generally conducts reconnaissance soil surveys which only identify major differences between soil groups covering 20 to 40 acres. In these reconnaissance surveys, the soil groups often contain small inclusions of differing soil types. Higher intensity soil surveys are used for more developed regions and open fields. These surveys identify soils in units as small as 3 to 6 acres, but these too contain areas of other soils. SCS soil surveys are intended for general informational uses only.

Only a portion of the state has been mapped by SCS, and much of the area that has not been mapped falls within LURC jurisdiction. SCS estimates that mapping of the state will not be completed before the year 2005. No mapping has been done by SCS in most of northern and central Maine (northwestern Aroostook and Piscataquis counties), much of Washington County, part of Hancock, and small parts of Oxford, Franklin, and Somerset Counties. Mapping is complete and publication planned for portions of Franklin County. Field mapping is complete for small sections of Washington County, most southern sections of Piscataquis and Somerset, and northern sections of Oxford and Franklin. Completed surveys exist for eastern and northeastern portions of Aroostook County. The soil survey for Penobscot County has been published but is now out of print.

Mountain Resources

The Appalachian Mountains, the spine of the eastern seaboard, reach their northern terminus in LURC jurisdiction. They stretch northeast across the state, ending with Mount Katahdin, the highest peak in Maine (5,267 feet). Many of Maine's mountains are composed of granite, particularly those in the Downeast Mountain and Mountain Upland regions. Others are composed of volcanic rock, such as Mount Kineo, or metamorphic rock, such as Bigelow Mountain.

Mountaintops are fragile environments with harsh, subalpine climates characterized by lower temperatures, higher wind velocities, higher humidity, and more precipitation than areas at lower elevations. The growing season is shorter, soils are often fragile, shallow, acidic, and infertile, and slopes are steep, resulting in greater vulnerability to erosion. The diversity of vegetation decreases as elevation increases, a reflection of the harshness of the environment. Plant communities of low diversity are generally a product of greater environmental stress. On upper mountain slopes, plant communities are composed of mosses, lichens, sedges, and grass-like plants which are very sensitive to disturbance. At lower elevations, communities of stunted fir, spruce, and birch are found, usually followed further downslope by a forest of balsam fir, red spruce, and white and yellow birch. The growth rates of all species are slower at high elevations. A rare plant species found in mountainous areas in the jurisdiction (Boott's rattlesnake-root) is under review for federal endangered/threatened status.

Mountain areas are important sources of high quality surface and ground water. Mountains receive more precipitation than lower elevations. This water filters through soil and fractured rock and ultimately adds to stream flows, springs, and groundwater supplies at lower elevations.

Uses of Geologic Resources

Bedrock and Mineral Resources

Some bedrock formations have specific economic values. Development and utilization of Maine's mineral resources have contributed to the state's economy for more than 150 years.

Historically, the state is best known for its granite quarries, but limestone and metallic ores have also been mined, as have feldspar, mica, mineral specimens, and gemstones. The Katahdin Iron Works, located in the jurisdiction near Brownville, is the site of Maine's only 19th century iron works operation. Iron was extracted from iron sulphide ore at the Iron Works from 1844 until 1890.

Over the past decade, there has been a national effort to identify more of the country's mineral resources, with the goal of making the United States less dependent on foreign sources. As a result, interest in the state's mineral resources has grown, and exploration is underway for a number of minerals in the jurisdiction, including copper, lead, zinc, nickel, cobalt, tin, tungsten, silver, gold, and bismuth. In 1978, a large deposit of copper, gold, and zinc was discovered near Bald Mountain in Aroostook County. Interest in mining this and other sites has fluctuated, reflecting the changing economics of mining as metal prices rise and fall. Several permits have been issued by LURC for various levels of metallic mineral exploration. Most activity has focused on the Bald Mountain site in T12 R08 WELS in Aroostook County and a site in Lower Enchanted Township in Somerset County.

Economically valuable deposits of certain semi-precious stones are also present in the jurisdiction. Tourmaline and (less commonly) beryl and topaz are sometimes found in pegmatite, a coarse-grained granite that often contains much larger minerals than typical granite. In 1972, a series of tourmaline pockets were found at a mine in Newry, which abuts the jurisdiction in the western mountains. Interest in gemstone mining persists, generally on a small scale. Most gemstone mining is occurring in the western mountains.

Fractured bedrock is an important repository of potable water. Most of the jurisdiction is not serviced by public water supplies, so the availability of potable water on-site is an important land use consideration. Groundwater is discussed in greater detail in the Water Resources section.

Soils and Surficial Resources

Soil, the primary medium supporting plant growth, is critical to biological life. Timber production continues to be the principal use of soil resources in the jurisdiction. A small amount of land remains in agricultural use.

Another use of soil is topsoil removal for use in development projects. It is unknown whether this activity occurs in significant amount in the jurisdiction, but it will be discouraged since it permanently reduces land's productive capacity.

Soil and subsoil, along with the unconsolidated material they lie over, also play an important role in the disposal of wastes. They absorb and purify domestic wastes in septic systems and, on a larger scale, they dictate what areas are appropriate for disposal of municipal or special waste in landfills. Because of their distance from population centers, sites with suitable soils within the jurisdiction have been potential candidates for waste disposal facilities.

Surficial deposits are economically valuable for sand and gravel extraction. Recent studies suggest that the distance materials are being transported to job sites is increasing. As existing supplies in production are exhausted, demand for materials in states to the south may increase demand for material from Maine.

Many surficial deposits have important natural values as well. For example, eskers are unusual landforms that are limited in number, and some sandy areas support unique plant communities.

Mountain Resources

Timber production is the most common economic use of mountain areas. Between 1983 and 1992, the Commission issued 16 Forestry Operations Permits (FOP's) for harvesting in P-MA zones, affecting approximately 6,500 acres of land. Intensive recreational development, ranging from ski areas and four-season resorts to vacation homes, is also located in some mountainous areas. Windpower development is the newest proposed use of mountain resources. Metallic mineral mining may be proposed for mountain areas as well.

Primitive recreation is a common activity in mountainous areas. Hiking, cross-country skiing, snowshoeing and other forms of recreation in these areas are generally compatible with the natural and cultural values associated with mountains.

LURC Regulatory Approach

Bedrock and Mineral Resources

In 1991, the Commission and the Board of Environmental Protection jointly adopted comprehensive rules regulating metallic mineral mining

activities in the state (Chapter 13 of the Commission's rules). These rules provide for a permitting process that consolidates a number of previously separate permits required by the Department of Environmental Protection and LURC. Concurrently, the Commission adopted rule changes regarding zoning issues associated with mining. Mineral exploration is allowed in most zones, but major exploration and mining are only allowed in a Planned Development (D-PD) Subdistrict. Chapter 12 of the Commission's rules provides guidance regarding how the Commission will evaluate proposals to rezone areas to the D-PD zone for purposes of metallic mineral mining.

The Commission's procedures establish a two-stage permitting process for mining operations. First, a developer must petition the Commission to rezone the area proposed for mining and related facilities to the D-PD Subdistrict. If the area is deemed appropriate for this type of use and rezoned, the site review process follows, focusing on design, engineering, and environmental protection.

Soils and Surficial Resources

The Commission has established a Soils and Geology Protection (P-SG) Subdistrict to protect areas that have precipitous slopes (slopes greater than 60%) or unstable characteristics from uses or development that could cause accelerated erosion, water sedimentation, mass movement, or structural damage. The Commission has also adopted standards for timber harvesting in sensitive areas, roads and water crossings, and filling and grading, to establish sound land use practices designed to minimize erosion and prevent sediment from entering surface waters.

Under the Commission's rules, small gravel operations (less than 5 acres) and pits used solely for road purposes can occur in General Management (M-GN) zones. Larger commercial operations generally must occur in areas zoned for commercial-industrial development. The Commission also has specific standards governing mineral exploration and extraction activities.

Mountain Resources

To protect the fragile environment and values associated with mountain areas, the Commission has placed lands at elevations above 2,700 feet in the Mountain Area Protection (P-MA) zone. The Commission's standards include provisions to include areas below 2,700 feet in the P-MA zone where site conditions warrant, and to exclude areas above 2,700 feet where it is demonstrated that other designations will not jeopardize the resource values of these areas.

The P-MA zone regulates certain land use activities in mountain areas to preserve the natural equilibrium of vegetation, geology, slope, soil, and climate. This protection zone reduces the risks to public health and safety created by misuse of unstable mountain areas, protects water quality, and preserves mountain areas for their scenic and remote values, wildlife habitat, recreational opportunities, and other uses. Approximately one hundred mountains in the jurisdiction meet the general criteria for P-MA zoning.

Geologic and Mountain Resource Issues

Bedrock and Mineral Resources

Modern metallic mineral mining has not been practiced in Maine on a large scale, so it is difficult to predict the economic and environmental implications of this land use. A large mining facility can bring significant economic benefits to the state, expanding its economic base and creating employment opportunities. Such benefits are particularly valuable in rural areas which lack a diverse economic base. But this activity has potential to cause serious environmental problems, and the Commission will evaluate proposals for metallic mining operations with particular care.

Contamination of surface and ground water is the greatest potential environmental risk associated with mining and encompasses several aspects of the mining process. First, water used in processing may become contaminated and must be properly treated before it is discharged to the receiving waterbody. Second, water and air interacting with the mine pit surface and waste material can generate sulfuric acid, which leaches heavy metals from rocks and soil with which it comes into contact. Measures must be taken to prevent contamination of groundwater by the tailings impoundment, and water must be prevented from coming into contact with exposed metal-bearing rock and waste material. These measures must be permanent to ensure long-term protection of water resources.

The Commission's approach to mining is aimed at providing an appropriate mix of flexibility and control as reflected in Chapters 12 and 13 of the Commission's Rules. In recognition of the site specific nature of mining, large-scale mining facilities are allowed in planned development zones which are not required to be adjacent to existing developed areas. The rezoning phase focuses on the socio-economic and environmental effects associated with metallic mining facilities. The site review process is designed to ensure a high quality operation that is protective of existing uses and natural resources, and establishes specific data gathering requirements and standards regarding facility design, operation and closure.

Surficial Resources

Gravel extraction operations have the potential to adversely affect their surroundings. Historically, most gravel pits in the jurisdiction have been small scale and at low densities. If demand for gravel increases, the Commission may see more proposals for larger scale extraction operations.

The Commission will continue to differentiate between small pits needed to accommodate localized demand and larger pits used to service a larger, more regional demand. Because of their proportionately greater impact, large extraction facilities will receive greater scrutiny on issues of location, need, and impact on existing uses and resources.

The Commission will periodically review its standards for gravel pits to ensure that existing uses and resources are adequately protected. It will also seek to review its permitting process to promote consistency with rules administered by the Department of Environmental Protection and to ensure these facilities receive an appropriate level of review in a timely manner. The Commission will maintain a policy of prohibiting excavation below the water table in most cases and requiring reclamation of excavated areas.

As information about the location of sand and gravel aquifers improves and more Aquifer Protection (P-AR) zones are designated, the Commission must address the potentially competing demands for water supply and gravel extraction. Identification and protection of other values associated with surficial deposits will also continue.

Soil Resources

Soil mapping in the jurisdiction is incomplete, and the Commission is frequently without benefit of readily available, detailed information on soils

when it reviews applications. The Commission needs more comprehensive soils information to ensure that development is not located on inappropriate soils. Since soils information will not likely be available for the entire jurisdiction for some time, and the information available is only appropriate for very general use, the Commission will determine which types of activities it needs better soils information for and require applicants to provide this information.

For many years, the Maine Subsurface Waste Disposal Rules (also known as the state plumbing code) have played an important role in determining whether land is suitable for development and the Commission's standards have reflected this function. The agency responsible for administering these rules, the Department of Human Services, however, does not believe the plumbing code should be relied on as a growth management tool, and it has enacted a number of changes that allow more engineering of septic systems to overcome site constraints. In light of these changes and other considerations, such as nitrate contamination, that are not addressed by the plumbing code, the Commission will evaluate the adequacy of its standards concerning overall soil suitability.

One of the greatest threats to soil resources is erosion. Erosion is the detachment of soil particles and loss of soil from an area by the action of water, ice, gravity or wind. Natural erosion is that which occurs under natural environmental conditions of climate and vegetation, undisturbed by man. Natural erosion has been occurring at a slow rate since the earth was formed, accounting for the levelling of mountains over geologic time and the associated development of landscape features such as plains, valleys, and deltas from transported sediment.

The normal process of erosion can be accelerated by disturbance of the natural environment through clearing, earthmoving, excavating, and other land use activities that expose soil or alter normal drainage patterns. These activities can increase erosion to rates which significantly exceed natural rates and adversely affect natural resources.

Erosion is a major threat to the productivity of land. As topsoil is lost, land's productive capacity declines and it becomes less able to support vegetation. Its ability to absorb and infiltrate water is also greatly reduced, resulting in decreased groundwater recharge and accelerated erosion of sediment by surface runoff. In sufficient quantity, eroded sediment can adversely affect aquatic environments as well.

The greatest potential causes of erosion and associated sedimentation in the jurisdiction are land management roads and development. The Commission's standards for roads and water crossings have helped to minimize erosion problems associated with land management roads. The Commission will continue to pursue ways of promoting effective erosion control measures for land development, including measures designed to minimize short-term erosion and sedimentation associated with the construction phase and permanent measures designed to prevent long-term increases in erosion. The Commission will continue to base its considerations and decision-making on the most current information available, and will always give preference to nonstructural measures to minimize erosion, such as limiting clearing, retaining vegetative buffer strips, and careful siting.

Mountain Resources

Mountains and the scenic, natural, recreational, economic and other values they possess are a limited resource in Maine. Mountain areas are increasingly popular sites for recreational facilities, vacation homes and windpower generation. Mountain development carries a significant risk of erosion due to steep slopes and the high erosion potential of many mountain soils. It also threatens to diminish many of the values associated with mountain areas, including scenic qualities and vegetative communities. Consequently, proposed uses of mountain areas must be carefully evaluated to ensure that important values associated with these areas will be preserved for this and future generations. The Commission recognizes that there is disagreement about the significance of high mountain values. It will continue to consider all perspectives when evaluating specific proposals.

Ski areas, popular for recreation and as destination resorts, are frequently located at least in part in Mountain Area Protection (P-MA) zones. While the proposal of new ski areas is unlikely, the Commission will probably continue to receive proposals to expand existing areas. Such proposals must be evaluated carefully to ensure that mountain resource values are not degraded.

While many of the jurisdiction's mountain areas have excellent wind energy resources, wind turbines and associated infrastructure have the potential to compromise the values the P-MA zone is designed to protect. Proposed windpower sites are most appropriately rezoned to the Planned

Mount Abraham

Development (D-PD) Subdistrict, and a number of issues deserve particular attention during the rezoning and site development process. They include:

- *Visual impacts.* Turbines and power lines sited on mountaintops and ridgelines have the potential to be visible from long distances away.
- *Soils impacts.* Many soils in mountainous areas are extremely sensitive to disturbance. Construction of access roads on steep slopes is probably the biggest potential threat.
- *Wildlife impacts.* Birds flying into turbine blades is a major concern.
- *Technical feasibility.* Large-scale windpower generation is an untested technology in harsh climates such as Maine's.

In light of the limited supply of mountain resources and their value, it is unlikely that all such areas will be considered suitable for rezoning and associated development by the Commission. The Commission has also determined that off-site measures may not be an appropriate means of mitigating adverse impacts identified for particular proposals.

In the longer term, the most reasonable approach to windpower siting issues may be to conduct a comprehensive study of where they are most and least appropriate or perhaps a broader study to identify high mountain resources with particularly high resource values which are not appropriate for most development. The Commission believes such a study is best conducted as part of a statewide effort.

The lands of the jurisdiction offer exceptional recreational' opportunities for Maine residents and visitors alike. These opportunities are created by the presence of recreational resources that are unparalleled in the Eastern United States in terms of abundance, diversity and uniqueness, including:

- More than 3,000 lakes and ponds, ranging from tiny kettleholes to 74,890-acre Moosehead Lake.
- Over 16,000 miles of rivers and streams, from mountain rivulets to the mighty St. John. The area possesses the highest con-

centration of undeveloped rivers in the East, and includes the Allagash, the nation's first state-administered wild and scenic river. Renowned canoe routes follow this and other rivers.

- Five significant whitewater river segments with dependable summer flows. These include two heavily used whitewater rafting areas.
- Approximately 100 mountain peaks over 3,000 feet high, including the Bigelow Range and Saddleback Mountain.
- The Appalachian Trail, which includes 281 miles in Maine – much of it within the jurisdiction – terminating at Mt. Katahdin.
- Abundant and diverse wildlife resources that include moose, deer and bear, and populations of rare species such as the Canada Lynx and golden eagles.
- Diverse fishery resources that include wild landlocked salmon and trout.

As exceptional as these resources are, it is the area's remoteness and lack of development that sets it apart. There is something special about hunting, fishing or camping surrounded by over 10 million acres of largely undeveloped forestland. For many users, these remote, undeveloped qualities not only enhance, but essentially define, their recreational experience, distinguishing it from excursions in more populous areas. As other recreational lands are increasingly developed, opportunities for backcountry experiences will become scarcer, and the remote values of the jurisdiction will become even more highly prized.

The very attractiveness of these areas for recreational pursuits, however, can lead to increased use and development that can diminish these qualities and other recreational values as well. In some cases this diminishment may be subtle: the exceptional fishing on a pristine pond may be slowly eroded as the number of users and boats increase, eventually resulting in a recreational experience more similar to one in a more populous area of the state or country. In other cases, impacts may be more immediate and obvious: seasonal home development and the roads constructed to serve it may quickly transform the remote character of an area and even negatively affect the natural resources that have provided the recreational opportunity. This tension between utilizing recreational resources and ensuring that this use does not adversely affect the value of these resources is a recurring theme in many of the issues involving recreation. In its policies, the Commission seeks to balance these considerations, recognizing the need to accommodate recreation-related activity and development while preserving the values that make recreating in the jurisdiction so special.

Recreational Resources

Recreational Lands

Private Lands

Public lands represent only a small percentage of lands within the jurisdiction used for recreational purposes. Traditionally, the public has enjoyed recreational use of millions of acres of undeveloped private land for free, or at minimal cost.

North Maine Woods, Inc., a nonprofit organization representing major landowners, manages recreational use of over 2.8 million acres of private lands north of Baxter Park and west of Route 11. Through a series of checkpoints, the organization collects user fees and monitors use of the area.

[1]This plan generally uses the term "recreation" rather than "tourism" to categorize uses and facilities related to the many outdoor pursuits enjoyed by residents of and visitors to the jurisdiction. Recreation is the term used in the LURC statute, in previous comprehensive plans and in the Commission's rules. Many outdoor sports enthusiasts do not consider themselves tourists, and the term tourism encompasses many activities and facilities that do not occur within the jurisdiction. The Commission, however, recognizes that recreation is part of the larger economic sector of tourism, and that this sector is gaining in its importance and planning implications. In specific discussion of economic benefits and impacts, the term tourism is generally used. But generic use of the word recreation is not intended to deemphasize the economic importance of tourism to the jurisdiction.

The organization also manages the 200,000-acre Ki-Jo-Mary multiple use area located west of Millinocket.

North Maine Woods maintains and develops a network of campsites in these areas and provides visitors with travel directions, information on recreational opportunities and general assistance. The organization also collects information on public use trends that can be used for recreational planning. North Maine Woods works cooperatively with a number of state agencies, and is under contract to collect fees and maintain campsites on several state owned lands.

Outside the areas managed by North Maine Woods, recreational opportunities are available on most larger tracts managed for forestry purposes, although landowner policies on public access vary. Private roads, some with checkpoints, others ungated, provide access to most of these areas.

Public Lands

Lands in the jurisdiction used solely for public recreation are owned and managed primarily by state agencies. The Department of Conservation, Bureau of Parks and Lands, manages approximately 41,000 acres of state park land in the jurisdiction. These include the Allagash Wilderness Waterway, Cobscook Bay State Park, Grafton Notch State Park, Lily Bay State Park and a portion of Rangeley Lake State Park. In addition, Baxter State Park (202,539 acres) lies in the middle of the jurisdiction. It is managed by the Baxter Park Authority, and, by opinion of the Attorney General, is not subject to the Commission's regulatory authority.

Other publicly owned lands are managed for multiple use, of which recreation is a major component. The Bureau of Parks and Lands manages roughly 414,000 acres of public reserve lands in the Commission's jurisdiction. It is the Bureau's task to determine the most efficient and economic management of each public lot for multiple use purposes, including forestry, recreation, and wildlife habitat. The largest of the public reserve lands is the Bigelow Preserve in Franklin County.

Not included in the numbers on state ownership are the Great Ponds – all lakes and ponds ten or more acres in size – which are owned by the state with Common Law rights, allowing pedestrian access and use by the public.

The federal government administers 100,700 acres within the jurisdiction, including a portion of the White Mountain National Forest in Oxford County and portions of the Moosehorn National Wildlife Refuge in Washington County. While these lands are managed for a variety of public purposes, forestry, recreation and preservation of wildlife habitat are the most significant. The White Mountain National Forest is managed pursuant to a detailed management plan which has been approved by the Commission, and is implemented through a Resource Plan Protection (P-RP) Subdistrict.

The Appalachian Trail in Maine stretches from Mount Success on the New Hampshire border to Mount Katahdin. Of the 281 miles of the Appalachian Trail in Maine, almost all are located in the jurisdiction. The National Park Service now owns about 30,000 acres which protects 180 miles of the trail. The remaining 100 miles pass through state-owned lands.

The Nature Conservancy manages a number of parcels in the jurisdiction. These lands include Big Reed Forest Preserve and the Hermitage, in Piscataquis County; Marble Fen and Seboeis River Gorge, in Penobscot County; Moose River Preserve, in Somerset County; Rocky Island, in Aroostook County; and Bradbury Island, Mark Island, and Sheep Island, all in Penobscot Bay. While these lands are held for preservation, nonintensive public recreation is allowed in some areas.

Of the nearly 4,500 miles of river canoe routes in the state, many are in the jurisdiction and are used extensively for canoeing, kayaking, and on some river segments, whitewater rafting. Stretches of the Kennebec River and the West Branch of the Penobscot have some of the most challenging whitewater rapids in the Northeast. Other major canoe routes include the Allagash, St. John, Dead, Machias and Moose Rivers.

Recreational Use and Demand

Although it is difficult to generalize about all activities, the trend since the early 1970's has been one of increased recreational use and demand within the jurisdiction. For a number of activities, demand slackened during the mid-to-late 1980's, paralleling the Northeast's economic downturn. In the early 1990's, however, use has grown steadily for most activities, and this trend is expected to continue and even accelerate throughout the decade. The demand for backcountry recreational uses in the Northeast is estimated to be growing at

a rate that is more than double the population growth rate.

The best sources for information on recreational use are the Statewide Comprehensive Outdoor Recreation Plan (1993), produced by the Department of Conservation, Bureau of Parks and Recreation, and updated every five years; and information compiled by North Maine Woods.

Trends

Figure 1 illustrates use trends for the area managed by North Maine Woods. Overall recreational use increased most rapidly in the late 1970's and early 1980's, and has risen more slowly in the late 1980's and early 1990's with periodic downturns. Since 1976, total visitor days have increased by 50%, with hunting and fishing the dominant activities.

For the large areas of the jurisdiction that are not managed with a system of checkpoints, it is impossible to accurately determine use levels. In a 1991 survey of Maine residents conducted by the Bureau of Parks and Recreation as part of its Statewide Comprehensive Outdoor Recreation Plan, the following activities had high levels of participation: pleasure boating and lake/pond fishing (38%), flatwater canoeing (32%), developed site camping (26%), river/stream fishing (25%), deer hunting (22%), primitive camping (21%), and day hiking (20%). In analyzing these and other sources of data the following trends are evident:

- The majority of recreational users are Maine residents. For the North Maine Woods area, 77% of the visitors were from Maine, 10% were from Canada, and 8% were from other New England states.
- Resident hunting licenses have declined in the 1990's, but this has been offset by increased sales to nonresidents. The reestablishment of the moose hunt has contributed significantly to the number of hunting days.
- Whitewater rafting use increased dramatically during the 1980's as this industry developed, but growth slowed in the early 1990's due to state-imposed limits and other factors. In the mid-1990's, there has been an upturn in use, resulting mostly from increased weekday trips.

Table 1: Major Public Lands Within the Jurisdiction Used for Recreational Purposes

Public Lands	County	Agency	Acreage
State Owned Lands			
Allagash Wilderness	Aroostook	Bureau of Parks and Lands	22,840
Grafton Notch State Park	Oxford	Bureau of Parks and Lands	3,190
Cobscook Bay State Park	Washington	Bureau of Parks and Lands	868
Lily Bay State Park	Piscataquis	Bureau of Parks and Lands	924
Rangeley Lake State Park	Franklin	Bureau of Parks and Lands	400
Bigelow Preserve	Franklin	Bureau of Parks and Lands, others	43,244
Mahoosuc Unit	Oxford	Bureau of Parks and Lands	27,253
Namakanta/Rainbow Unit	Piscataquis	Bureau of Parks and Lands	26,692
Duck Lake Unit	Hancock	Bureau of Parks and Lands	25,220
Eagle Lake Unit	Aroostook	Bureau of Parks and Lands	23,882
Round Pond Unit	Aroostook	Bureau of Parks and Lands	23,114
Telos Unit	Piscataquis	Bureau of Parks and Lands	22,806
Richardson Lake Unit	Oxford	Bureau of Parks and Lands	22,640
Debouillie Mountain Unit	Aroostook	Bureau of Parks and Lands	21,871
Federally Owned Lands			
White Mountain National Forest	Oxford	U.S. Forest Service	48,029
Moosehorn National Wildlife	Washington	U.S. Fish and Wildlife	22,600
Appalachian Trail	Several	U.S. Park Service	Approx. 30,000

- Snowmobiling has become a major winter recreational activity in the jurisdiction. Statewide, snowmobile registrations increased 5.7% per year between 1970 and 1993.
- Overall, people are recreating more often, but for shorter periods of time. This puts more pressure on "peak" weekends such as Memorial Day and Labor Day.

Future Demand

The demand for recreational opportunities within the jurisdiction will continue to increase due to the following factors:

- Improved road access to recreational opportunities and better maps and guidebooks.
- Loss of recreational opportunities in more developed parts of the Northeast and Maine, and increasing interest in backcountry experiences and nature study.
- The aging of the population as baby boomers move into middle and senior age brackets. While this group will engage is less active forms of recreation than when they were younger, they are likely to have more leisure time and more money to spend on recreational pursuits and expensive equipment such as recreational vehicles and powerboats.

Whether recreational use in the late 1990's increases rapidly or more slowly will be largely dependent on the pace and extent of economic recovery in Maine and the Northeast. According to the Statewide Comprehensive Outdoor Recreation Plan, resident user days are expected to increase moderately between 1994 and 1999 for hunting, pleasure boating, lake and pond fishing, canoeing and kayaking, and ski touring. User days are expected to increase slightly or stay the same for riding off-road vehicles, primitive camping, river and stream fishing, downhill skiing, hiking, snowmobiling and nature viewing.

The aging of the population may have a greater effect on demand for certain recreational facilities than on activities themselves. Older residents will continue to fish, hunt, boat and snowmobile, but they may want lodging and support facilities that offer more services and amenities. As the more affluent of this group move toward retirement age, there is likely to be an increased demand for destination resorts and for new and upgraded dwellings for primary or vacation residences.

Recreational Use Characteristics and Impacts

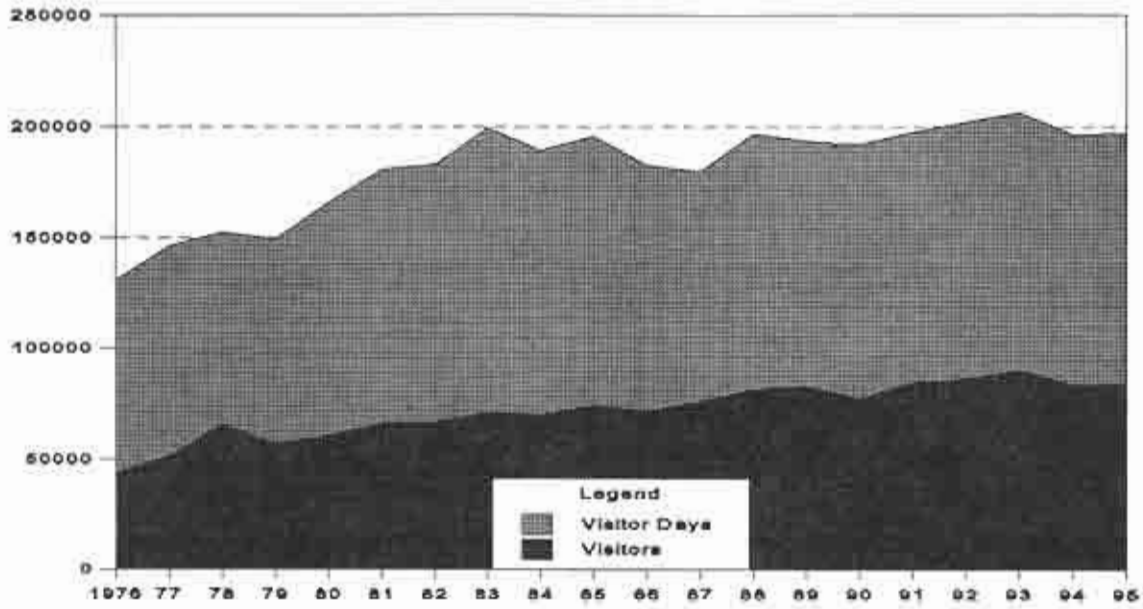
The term "recreation" encompasses a wide range of activities and facilities that differ markedly in regard to typical users, costs to participate, intensity, compatibility with other uses, natural resources they depend on, and potential adverse effects. The Commission has long recognized such differences in its policies of promoting primitive recreational activities and diversified, nonintensive, nonexclusive use of recreational resources. Nonexclusive uses are those in which a wide range of people can participate, generally at reasonable cost.

Evaluating activities and facilities according to the factors listed above provides additional guidance on which uses are most compatible with the Commission's values and which have potential for adverse impacts.

The most obvious kinds of impacts are those that cause harm to surroundings and natural resources: trail and campsite damage, slope and

Camping along the Penobscot River

Figure 1: Use Trends for North Maine Woods area, 1976-95



shoreline erosion, water pollution and harm to fish and wildlife. But there are also a number of impacts that, while not causing serious environmental damage, may affect the recreational experience for other users. These include noise, smells and emissions, trash, lighting, and other visual effects.

Recreational Activities

Sightseeing and nature viewing are probably the most "passive" of the recreational pursuits. These activities depend on the maintenance of scenic resources and wildlife habitat. Sightseeing and foliage viewing are most common in the more accessible parts of the jurisdiction, especially at state parks, islands with ferry service, and natural, historic and cultural sites. As the population ages, these passive forms of recreation are expected to increase in popularity.

Hiking, mountain climbing, backpacking, primitive camping, ski touring, snowshoeing, and canoeing and kayaking (flatwater and whitewater) are more active pursuits that generally depend on the availability of trails or accessibility to backcountry areas or water resources. A major aim of most of these activities is to get away from it all and to experience a wilderness setting; they are therefore very sensitive to intrusions by development and by more intensive activities. Hiking and camping activities can cause wear-and-tear on trails and sites, which require periodic maintenance as a result. The winter activities in this group have little negative impact.

Mountain biking is a relatively new recreational activity within the jurisdiction that also depends on trails. The activity has the potential to cause trail damage, but use appears to be dispersed and at low levels. The activity is prohibited by landowners on many land management roads because of safety concerns regarding conflicts with logging trucks.

Hunting, fishing and trapping are primitive recreation pursuits that have a rich tradition in the Maine Woods. These activities depend on the maintenance of high-value wildlife resources and the habitats that support them. The abundance and diversity of wildlife in the jurisdiction makes for exceptional hunting and fishing, but users are also attracted by the opportunity to engage in these activities amidst a remote setting. Although they are "extractive" in that they entail the harvesting of wildlife, this extraction is carefully managed so that wildlife resources are not only minimally affected, but often enhanced. Over the course of a year, fishing is probably the most intensive activity among this group, especially on lakes and streams with high-value fisheries. However, during the fall, moose and deer hunting are dominant recreational uses within the jurisdiction.

Motorized recreation within the jurisdiction includes snowmobiling, power boating, and use of backcountry vehicles such as all-terrain vehicles, dirt bikes, and 4-wheel drive trucks. These activities vary considerably in their characteristics and

impacts. While most users of motorized vehicles are attracted by the jurisdiction's remote qualities, they are generally more tolerant of the presence of other recreational users and some forms of development.

Snowmobiling depends on snowy winters and the maintenance of trail systems. An extensive network of trails passes, for the most part, over privately owned land and trails typically maintained by snowmobile clubs. Snowmobiling generally has less impact than other forms of motorized recreation. With thousands of miles of unplowed roads and acres of frozen water in the jurisdiction, the use is dispersed over a wide area. Because it generally takes place on frozen ground, it has minimal impacts on trails.

While power boating is enjoyed as a recreational pursuit by itself, it is often used to access fishing areas. It is dependent on access to waterbodies, usually in the form of a boat launching ramp that is accessible to trailers or a seasonal camp. The impacts of motorized boating are highly variable, depending on the size, power and purpose of the craft and the nature of the use area. While a number of small boats with low horsepower engines may hardly be noticed, a high-powered speed boat may affect most of the other users on a lake and its shores.

Backcountry vehicles are used extensively within the jurisdiction both as a means of accessing remote areas to engage in other recreational pursuits and as a form of recreation themselves. Use of all-terrain vehicles is probably the most common activity in this group, although a number of private land owners restrict it on their roads and trails. The primary physical impacts of backcountry vehicles are trail wear and accelerated soil erosion, especially when conducted in areas without adequate base. The noise levels of unmuffled vehicles are particularly high and have potential to disrupt other recreational users.

Whitewater rafting is an organized, high-volume, nonmotorized activity that utilizes outstanding stretches of rapids, primarily on the West Branch of the Penobscot and Kennebec Rivers. The intensity of whitewater rafting, and its potential impacts, are shaped by its dependence on timed releases from upriver dams. During these release times, rafting represents a dominant, high visibility use that may intrude upon other recreational users. The facilities associated with whitewater rafting are discussed in the next section.

Recreational Facilities

Recreational facilities within the jurisdiction provide either direct recreational opportunities or support services such as lodging and equipment outfitting that cater to recreationists. In considering recreational support facilities, it is also important to consider services available in communities that border the jurisdiction. Towns such as Rangeley, Greenville, Millinocket, Jackman, Ashland, Allagash, and Lincoln have traditionally served as gateways to the North Woods, and facilities and services located there help meet recreational demand generated by the jurisdiction's resources.

The jurisdiction's recreational facilities range from primitive campsites to expansive ski areas. While some facilities are located in state parks and other public lands, most are located on private lands, usually near water bodies.

Boat launches are a support facility that provide access to waterbodies. They are located on most of the larger lakes and ponds throughout the jurisdiction. Some sites provide access to motorized vehicles and ramps for trailers; other sites are hand-carry only. Most sites are owned and managed by either the Department of Inland Fisheries and Wildlife, Bureau of Parks and Lands or local governments.

Launches with trailer access are an example of a small-scale improvement that can significantly change the character of a water resource by increasing motorized boating. Actual impacts are highly dependent on the size of the water resource and its levels of use and development.

Dispersed, isolated recreational experiences are available at campsites run by both North Maine Woods, Inc. and the Department of Conservation. There are roughly 90 primitive sites managed by the state, and North Maine Woods manages over 600 campsites in Northern Maine. There are also a number of campsites located within state parks.

Properly located and designed campsites generally have low impacts, but their dispersed nature makes regular maintenance difficult, and their site conditions are largely affected by the amount of use they get and the camping practices of visitors. Primitive sites without motor vehicle access generally have the least impacts and may be the most compatible with the character of some remote areas.

Most campgrounds within the jurisdiction are privately run operations. As of 1994, there were at

least 20 commercial campgrounds in the Commission's jurisdiction, ranging in size from 20 to 60 sites. Many of these facilities provide utility hookups for trailers and recreational vehicles as well as other amenities.

Commercial campgrounds are usually sited near waterbodies. Campground impacts vary significantly depending on differences in size, amenities and the recreational experience the campground tries to create. Like sporting camps, some campgrounds focus on maintaining a wilderness experience for their clientele. Accordingly, such facilities are designed to enhance privacy and minimize disturbance to the natural setting. Other campgrounds serve as relatively high-density seasonal communities for recreational vehicles and trailers and have many of the potential impacts associated with this type of development.

Sporting camps within the jurisdiction have long provided hunters and fishermen with lodging, meal and other services amidst a wilderness setting. Over 30 traditional sporting camps are located in the area, most along lakeshores. In addition, there are a number of other commercial lodging facilities that meet the needs of recreationists.

Most sporting camps are located along lakes and rivers and are less accessible than commercial campgrounds. Sporting camps support mostly traditional, low impact activities such as hunting and fishing, but also serve forms of motorized recreation such as boating and snowmobiling. Sporting camps depend on the presence of high recreational values to attract and sustain their clientele, and they are very sensitive to the impacts of nearby development and uses that diminish these values. The impacts of sporting camps themselves vary according to their size and extent of improvements.

Most of the facilities supporting whitewater rafting were developed during the 1970's and 1980's when this sport grew rapidly in popularity. The highest concentration of bases is along Route 201 near The Forks. Bases generally consist of bunkhouses, dining halls – several of which are open to the public – and other amenities for their guests.

Whitewater rafting bases are distinguished from sporting camps and most campgrounds by the particularly high use they receive during the whitewater rafting season. On a busy weekend, each of the larger bases may feed, lodge and transport over 150 people. Generation of traffic, solid waste and sewage is significantly higher than most other recreational facilities, except for downhill ski areas.

Two ski resorts are based in the jurisdiction: Saddleback in Sandy River Plantation and Squaw Mountain in Big Squaw Township. In 1984, Saddleback received a permit from the Commission to significantly expand its operation. Squaw Mountain has limited snowmaking capacity, and its use levels have been low compared to the state's larger ski areas. The facility changed ownership in the early 1990's and future expansion plans are unknown.

Two other large alpine ski resorts, Sugarloaf USA in Carrabbassett Valley and Sunday River Skiway in Newry, are based in the fringe of the jurisdiction, and have a significant "spill-over" effect on adjacent townships. Sunday River, in fact, received approval from the Commission in 1990 to expand into neighboring Riley Township.

Alpine skiing is a destination-oriented activity with a clientele interested primarily in the speed and excitement of a run down a mountainside. Alpine skiing takes place primarily on privately owned land, and ski facilities usually offer a range of recreational and resort activities including ski touring and summer sporting opportunities.

Alpine skiing facilities are dependent on large mountains and intensive infrastructure: lifts, snowmaking equipment, roads and parking areas, and lodges. With much of this development occurring on mountainsides, there is obvious potential for adverse effects on natural resources and the visual character of these areas. But while these areas are among the most intensively developed and used areas within or adjacent to the jurisdiction, they are also intensively managed.

Most of the existing recreational facilities within the jurisdiction are inclusive in that they offer opportunities to enjoy the North Woods at a reasonable cost. Of the facilities listed, campsites and campgrounds are the least expensive to users. Boat ramps also must be considered highly inclusive because they provide water access to the general public.

The characteristics and impacts of seasonal housing development are covered in more detail in the development section of this plan. But it should be noted that this use, which is often classified as recreational, is exclusive compared with most other types of recreational facilities. And, cumulatively,

seasonal housing development may have the greatest impact on natural and recreational resources within the jurisdiction.

LURC Regulatory Approach

Consistent with state statute and its *Comprehensive Land Use Plan,* the Commission's approach to recreational uses focuses on supporting and protecting primitive recreational resources and opportunities. Primitive recreational activities are allowed in all zoning subdistricts, and a Recreation Protection (P-RR) Subdistrict has been applied to areas that "support or have opportunities for unusually significant primitive recreational activities" to protect them from incompatible development and other intensive land uses.

To date, the Commission has placed in P-RR zones approximately 300 miles of hiking trails, including nearly the entire Appalachian Trail. In addition, because of their significance as canoe trails or for other forms of recreational boating, the Commission has applied P-RR zoning to major portions of the Lower Dead, the Moose, the Penobscot and Allagash Rivers, and a number of other rivers and streams, listed in the Appendix. Resource Plan Protection zoning has been applied to major portions of the St. John and Penobscot Rivers. The Commission has also applied P-RR zoning to 177 remote, undeveloped ponds having a cold water game fishery. Through this form of zoning, the Commission will continue to support protection of the jurisdiction's most significant recreational resources.

Some significant recreational areas receive high levels of protection by zoning designations designed to protect underlying natural resources or values. The Accessible Lake (P-AL) Subdistrict applies to undeveloped, high value lakes that are accessible by roads. The Mountain Protection (P-MA) zone provides protection for areas above 2,700 feet elevation. And the Unusual Area (P-UA) Subdistrict covers areas with a variety of significant values that may also possess important recreational resources.

For recreational resources in other areas, there is no specific protection beyond that afforded by management district zoning or that applied normally to shoreland areas. The rationale behind this approach is that many nonintensive, outdoor recreational activities in these areas can coexist with other land use activities, including forest management.

Recreational facilities themselves are regulated like other types of development, although locational needs and potential impacts are accounted for. Low impact facilities such as camp sites are allowed in management zones without a permit and in most protection zones with a permit. Facilities with more substantial improvements such as sporting camps and campgrounds are permitted less universally, but are still allowed in General Management Subdistricts, and as a special exception in Great Pond zones.

Alpine ski area development is allowed in development zones and as a special exception in Mountain Protection (P-MA) zones. Most other recreational facilities are limited to development zones as well. For any development permit, impacts on natural resources, existing uses, and recreational resources are major review considerations.

While the Commission's approach to recreational uses is generally sound, there are a number of existing and emerging issues that warrant consideration as discussed below. Some of these issues suggest possible changes to the Commission's zoning framework, but most can be addressed by fine-tuning of policies and standards, by education and outreach, and by working with landowners and groups representing recreation users and suppliers.

Recreational Resource Issues

Impacts of Development

While the impacts of growth and development are discussed in greater detail in Chapter 4, the encroachment of development on recreational resources is a major issue that deserves highlighting here. Potential impacts include not only adverse effects on natural resources that provide the recreational opportunity, but diminishment of remote values that enhance the recreational experience. Development can also cut off or reduce public access to areas traditionally used by recreationists.

Seasonal housing development is most likely to occur in areas with high recreational values. Future demand for seasonal homes in these areas is expected to grow as the baby boomer generation moves toward retirement age.

Seasonal housing is appropriate in many areas of the jurisdiction, but it can conflict with the

Commission's goals of protecting primitive recreational opportunities and promoting diversified, nonintensive, and nonexclusive use of resources. Compared with most recreational facilities, seasonal housing gives relatively few people the opportunity to experience the jurisdiction's recreational resources. Owning a piece of remote Maine is a widely shared dream, but it presumes an unending supply of water frontage or scenic lands whose qualities are unaffected by others pursuing the same dream.

Although some seasonal development occurs in LURC-approved subdivisions, much of it occurs incrementally, on a lot-by-lot basis. The effect of this development pattern is often a gradual erosion of recreational and natural values that goes unnoticed or is accepted as inevitable. Over a period of time, this type of development can transform the character of an area as the number of cleared areas, roads, buildings, docks and boats increase.

While the Commission has enacted a number of measures to protect the jurisdiction's highest value recreational resources (e.g. P-RR and P-AL zoning), it will also ensure that incremental seasonal development is not eroding the values of other recreational areas. For proposals involving rezoning and subdivision review, the Commission will continue to encourage measures such as clustering and open space preservation to minimize the impact of new seasonal development. The Commission will seek to better address the impact of lot-by-lot development on recreational resources.

A significant percentage (46%) of the commercial development that occurred between 1971 and 1991 was also located near water bodies. Much of this development was small-scale and recreation-related. It occurred primarily in fringe areas or as expansions to existing facilities. The requirement that most new commercial operations receive a rezoning and development permit gives the Commission considerable control over protecting recreational resources. The Commission's rules are less clear regarding the appropriateness of expansions of nonconforming commercial uses in high-value recreational areas.

Large-scale projects such as hydroelectric facilities, mining operations and ski area expansions have the potential to dramatically affect adjacent recreational resources. LURC's policies and regulations governing these projects, however, provide the Commission with strong tools to promote their proper siting and site development. This is particularly true of regulations governing metallic mining. The Recreation Protection (P-RR) zoning of high-value rivers has also significantly reduced the threat of inappropriate hydroelectric development. For rivers not zoned P-RR, the Commission will carefully weigh the value of recreational resources in siting new dams. Issues involved with ski area development are discussed below.

Potential Use Conflicts on Waterbodies

As the areas receiving the most recreational use, lakes are the most likely location for use conflicts. Canoeists, kayakers, primitive campers, anglers, sailors, power boat enthusiasts, campground groups, sporting camp visitors and lakeside camp owners all come to take advantage of the values that lakes have to offer. And increasingly, other activities and vehicles such as high-speed powerboats and personal watercraft are making their way to lakes in the jurisdiction.

As the discussion of recreational characteristics indicates, various activities and facilities create very different effects and potential impacts, and some groups of users are more sensitive to these effects than others. Noise, obtrusive lighting, and excessive boat traffic are some of the effects that may disturb other users. And as more types of users use a finite resource, the likelihood of conflicts is heightened.

Larger lakes can generally accommodate higher levels of use without conflicts. But if these large lakes are highly accessible or are extremely popular because of their high resource values, activity levels per square mile of water area can exceed those on much smaller lakes, especially on peak weekends.

The location of a lake within the jurisdiction and the expectation of the user are also significant factors. For larger lakes on the fringe of the jurisdiction, the recreational experience may be much more similar to that on lakes in the organized areas. Lakeside residents and visitors may treasure periods of solitude, but they are accustomed to higher levels of use on the lake, especially on holidays and weekends.

These levels or types of uses, however, may seem totally incongruous on a smaller or more remote pond. Many users of those areas have travelled there to fish or camp in a wilderness setting and the quality of their recreational experience is predicated on quiet and extremely low levels of activity. In this context, the introduction of a high speed power boat or jet ski can significantly diminish the experience of an entire user group.

Any serious effort to address use conflicts should include a reexamination of the type and power of watercraft allowed on waterbodies within the jurisdiction. The issue should be evaluated in terms of anticipated impacts not only on natural resources, but also on remote values and the specific values of certain lakes. The Commission will work with other state agencies, sportsmen's groups and other interested parties in addressing this issue, particularly on remote lakes and those determined to have outstanding or significant values.

Likewise, the Commission will work closely with other state agencies and affected groups concerning the siting of new or improved boat ramps on waterbodies in the jurisdiction. These facilities have the potential to significantly change the levels and type of use on lakes and rivers. While increased motorized boat access may be appropriate on many waters in the jurisdiction, it may have negative impacts on others, particularly on more remote ponds that historically have had limited motorized access. Consistent with its lakes program, the Commission will review proposals for boat ramps allowing motorized access with particular care, especially those on Management Class 1, 2 and 6 lakes.

Public Access

As mentioned previously, a large percentage of the land used for recreational purposes is privately owned. Large landowners have continued the time-honored practice of allowing the public access over and use of most of their lands for hunting, fishing and other recreational pursuits.

But as access to private lands and associated use has increased, so too have concerns over the real and potential costs and impacts of this use. One group of issues involves landowner concerns. Even responsible use of private lands entails wear and tear on roads, trails and camping sites, and abuses such as trespassing, littering, vandalism, illegal dumping and site alterations can impose substantial costs on landowners. Just the presence of recreationists creates liability worries and the possibility that an errant camp fire could spark a devastating forest fire.

Unauthorized or unmanaged motorized camping on private lands can create overcrowding and adverse lakeside impacts, especially during peak vacation weekends. These situations may become more common as landowners and private operators increasingly charge fees to offset management costs and recreationists search for remaining "free camping" opportunities.

Such concerns have caused some landowners and their management companies to reconsider their stance concerning public access. Some have responded by gating land. Others have taken a more active role in managing recreational use. Posting of land is increasing among smaller landowners. A bill modifying the liability laws on public use of private land was enacted by the legislature, addressing some liability concerns, but others remain.

Private lands play an important role in meeting recreational demand, and their continued availability to the public should be encouraged. Promoting multiple use of land and resources is a broad goal of the Commission, and this principle remains central to the management strategy of most of the large landowners. But multiple use also means a balancing of land uses and ensuring that one activity does not threaten others, or harm resources.

While many of the decisions regarding public access are in the hands of the landowners, state agencies, recreational organizations and other interested parties can work together cooperatively to discuss and resolve problems. The North Maine Woods organization is an example of such a cooperative arrangement.

Another aspect of public access involves the effect of improved accessibility on publicly owned recreational resources. The ongoing construction of new land management roads creates additional opportunities for access to areas with high resource values. This improved access can lead to unexpectedly high levels of use, or ultimately to the development of seasonal camps.

The Commission will work with landowners and other state agencies to ensure that plans to extend or improve roads to high-value resources include consideration of the potential impacts of increased use and development. The Commission will also be supportive of efforts by landowners to close land management roads when they are no longer used for hauling timber, are not deemed essential for fire protection, and when doing so would help preserve the recreational and natural values of an area.

On the other hand, development and posting of land can lead to the restriction or elimination of access to lands traditionally used for recreation. In the review of proposed developments, the Commission will consider impacts on existing access routes.

Sporting Camps

Sporting camps are a traditional feature of the North Woods that support primitive recreational pursuits and some motorized activities such as boating and snowmobiling. Most sporting camps are located in remote settings, and maintenance of relatively pristine surroundings is essential to most of the camps in attracting and maintaining clientele.

The number of sporting camps within the jurisdiction has dwindled over the past 50 years to the point today where fewer than 40 traditional camps operate. Considering their cultural value and compatibility with remote recreational settings, a basic question is whether LURC's policies and regulations are adequately supportive and protective of these facilities.

One significant concern is the use of sporting camps as development "nodes" to justify rezonings on lakes in remote areas where adjacency could not otherwise be demonstrated. The ensuing development could diminish both the resource value of the pond and the viability of the sporting camp itself. The appropriateness of the present General Development (D-GN) zoning of many of these facilities will also be reexamined.

A parallel concern is the location of a number of sporting camps on lakes with other development zones or on Management Class 3 lakes where the adjacency criteria can be waived. Proposals to rezone land for development in the vicinity of sporting camps will need to demonstrate that the recreational and cultural values of sporting camps will be protected from incompatible development and land use.

The Commission has at its disposal a number of existing mechanisms that can help protect sporting camps. In the review of new development, it will promote clustered designs as an alternative to shoreline development sprawl, and features such as buffering and common water access areas to minimize lakeside impacts. And it will promote concept plans, especially for lakes with sporting camps, to minimize conversion of lake frontage to development.

The Commission will also support sporting camps by facilitating the permitting process for minor amendments and reconstruction projects.

Moose Point Camps on Fish River Lake

Also, given the small number of sporting camps and the large number of people for whom they provide recreation, the Commission will give special consideration in its development standards for sporting camps. Such special consideration may include the reconstruction of nonconforming structures, particularly boathouses and camps that are part of a cluster of buildings. While the main lodges of new sporting camps should meet the Commission's setback requirements for commercial structures, the guest cottages (which have comparable impacts to private residences) need only meet the dimensional requirements of private residences.

In conferring special status on sporting camps, two issues arise: (1) differentiating between traditional sporting camps and other recreational lodging facilities that do not merit special protection, and (2) the potential for conversion or expansion of sporting camps into facilities that are more intensive or less compatible with remote values. Both of these issues may be resolved by fashioning a clear definition of traditional sporting camps and the values they have that are worthy of protection.

Commercial Whitewater Rafting

The rapid growth of commercial whitewater rafting during the 1980's raised a number of concerns regarding its potential impacts on and compatibility with the jurisdiction's principal values. While there is now considerably less concern that commercial whitewater rafting will dramatically change the character of the jurisdiction, a number of considerations remain.

On the rivers where it occurs, commercial whitewater rafting is an intensive use that periodically crowds stretches of whitewater with boats and exuberant rafters. Others using the river, particularly fishermen, may see rafting as an intrusion on their enjoyment of the resource. The levels of use evident in the early 1990's, however, seem to strike an appropriate balance in controlling river congestion and recognizing other values and uses along these rivers. The appropriateness of these use levels needs to be periodically evaluated and any proposals to increase these usage levels should be reviewed with extreme care.

The high volume, high-turnover nature of most rafting bases distinguishes them from sport-

Whitewater rafting

ing camps and most campgrounds where users engage primarily in primitive recreational pursuits or dispersed motorized uses, and where use levels are relatively low. While some rafting operations have diversified to provide other recreational opportunities, including primitive activities, the Commission views businesses with a rafting component as fundamentally different from traditional sporting camps and primitive camping facilities. From the Commission's perspective, businesses with rafting operations are intensive recreational facilities which are best sited in appropriately located development zones, away from potential conflicts with existing uses, significant natural resources and other values of the jurisdiction. Larger rafting operations are most appropriately viewed as outdoor adventure resorts that are ideally located at the fringes of the jurisdiction near existing services and infrastructure.

In reviewing new businesses with rafting bases and expansions of existing ones, careful consideration will be given to on- and off-site impacts due to the high-volume use of these facilities. Traffic, parking, septic and solid waste considerations are especially important, as are screening and careful management of activity areas for existing bases near shoreland or residential areas.

Campsites and Campgrounds

Camping is an activity that occurs at many different types of facilities, ranging from primitive sites consisting only of small cleared areas and fire rings to sites in a full-service campground with sewer, water and electrical hookups. Most of the issues involving campsites and campgrounds relate to the development, management and regulation of these facilities in all their different forms.

The Commission's approach to camping facilities is to classify them into three subcategories – remote camp sites, campsites and campgrounds – and to regulate them according to their expected level of improvements, accessibility and impacts. The Commission will review these subcategories to determine whether they can be refined to deal with issues regarding which category particular facilities belong in and the appropriateness of standards or requirements for facilities once they are so classified.

For instance, the term "campground" seems to encompass a broad range of facilities, from relatively primitive and low impact clusters of sites that can accommodate a relatively small number of people, to fully improved facilities with utility service that more closely resemble seasonal trailer parks.

Like sporting camps, many campgrounds within the jurisdiction depend on their remoteness, low use levels and privacy to attract and maintain clientele; in this regard they are quite different from larger campgrounds elsewhere in the state which become full-blown communities during summer months, with all the services and impacts of relatively high-density housing development. The general trend in recent campground development has been toward more low-impact, primitive-style facilities, and these types of campgrounds are generally more compatible with the jurisdiction's values and recreational goals.

Both within campgrounds and elsewhere, issues have arisen regarding the length of residency of "camping" trailers, and at what point they should be treated as single-family homes. Without understood limits and consistent enforcement, there is greater likelihood that permanent siting of trailers will be used to circumvent the Commission's sewage disposal and dimensional requirements.

These and other issues will be addressed by refining the standards and definitions governing camping facilities, recognizing that there will always be gray areas in their classification and regulation. In any revisions, the Commission will continue to adhere to the principles that camping facilities should be treated according to intensity of use, potential impacts and characteristics of the resources on which they are sited. In more remote locations, preference will be given to facilities most supportive of primitive recreational uses.

Alpine Ski Areas

Alpine ski areas are the jurisdiction's most intensive recreational facilities, and most of the issues relating to them involve their potential impacts on natural resources and adjacent land uses and activities.

The most likely future trend is continued expansion of Sugarloaf, Saddleback and Sunday River ski areas, with a considerable amount of "spill-over" development – seasonal homes, lodging accommodations, restaurants and sports outfitters – in adjacent areas. These areas are all located on the edge or just outside the jurisdiction and are near major highway corridors; from an overall

planning perspective, expansion of existing areas is preferable to the development of a new ski mountain, especially one located in a more remote area. However, expansion of existing areas must be accomplished with extreme care to address the environmental constraints of mountainside development and to preserve the natural and recreational values of these areas.

For any future ski area expansion or related support service development within the jurisdiction, the Commission will pay particular attention to the following considerations:

- **The effect of wastewater disposal on surface and groundwater water resources.** As intensive recreational facilities, ski areas produce large volumes of wastewater. Several ski areas have sewer treatment plants that handle wastewater from resort facilities and related residential development. Proposals for new ski area expansion must demonstrate the adequacy of these systems in handling the additional wastewater generated from this development in an environmentally sound manner. The impacts of proposed on-site septic systems will also be carefully evaluated, especially in relatively densely developed areas on significant grades.
- **The impacts of snowmaking facilities on the quantity and quality of surface and groundwater resources.** While there is a lack of conclusive data linking snowmaking activities to water quality problems, this issue deserves further examination as snowmaking facilities are expanded and water usage is vastly increased.
- **The visual impact of ski area and related development on scenic values in the vicinity, especially from the Appalachian Trail and other significant trails and view points.** The proximity of both Saddleback and Sugarloaf to sections of the Appalachian Trail make this a particular concern, although sensitive layout and buffering can help minimize impacts. In approving Saddleback's expansion proposal, the Commission determined that there would be no undue adverse impacts on the AT. For Sunday River Skiway, the most likely impacts are those on scenic qualities of the Mahoosuc Range as continued expansion into Riley Township occurs.

Condos at Saddleback ski area

- **The secondary impacts of ski area development on roadside sprawl.** Ski areas attract lodging facilities, restaurants, sports outfitters, and other retail and service establishments, and seasonal housing – both single-family and multi-family dwel-lings. While there are opportunities for this sort of development to be clustered in a village setting (e.g. Sugarloaf's Mountain village), it often occurs in a strip pattern along highways and access roads leading to the mountain. Ski area-related development may well be appropriate in the adjacent fringe communities, but it can be designed in a manner that does not detract from an area's natural character and overall attractiveness. The Commission encourages clustering, good site design and a zoning approach that avoids development sprawl near ski resorts.

Tourism-Related Issues

With its multiple outstanding values, the jurisdiction has tremendous potential for recreation-based tourism. As the tourism sector continues to grow, however, a number of challenges and opportunities are likely.

Some recreation-based businesses are dependent on the maintenance of the remote and undeveloped character of many parts of the jurisdiction. Sporting camps and remote campgrounds are two examples of businesses that depend on these values. Guide services, nature tours, and outdoor leadership schools are others. The demand for such "nature-based tourism" is on the rise nationally, and opportunities within the jurisdiction appear considerable. These opportunities can be threatened, however, by the encroachment of development and resulting impacts on natural character values. As formerly remote areas become developed, these businesses are likely to lose clientele or be forced to move their operations elsewhere.

Many of the values that these businesses depend on are maintained by large landowners who have foregone development opportunities. While large landowners have historically allowed public use of their lands, most do not benefit economically from recreational use. In fact, public use generally results in increased management costs and liabilities for the landowner. Ultimately, landowners may be more willing to maintain relatively pristine areas for recreational use if they can benefit financially from the growing tourism sector.

Emerging Recreational Uses/Facilities

Recreational uses and facilities exist today that were probably not contemplated in the early 1970's. Likewise, in the future there are likely to be new recreational uses not considered by this plan.

The Commission recognizes that it must be flexible in its approach to this evolving field, and adapt its policies and standards to address new uses. On the other hand, the Commission will carefully consider the potential impacts of any new uses on the principal values of the jurisdiction. While the Commission encourages recreational diversity, it will ensure that new uses or activities do not diminish the experience for traditional recreational users.

Special Natural Areas

Certain rare plants, animals, natural communities and geological and hydrological features possess unique or outstanding qualities of educational, scientific, and social value. They cut across traditional resource categories to represent a fairly diverse list of animals, plants, and natural sites. These resources are scattered throughout the Commission's jurisdiction. Maine statutes recognize the benefits posed by such resources and provide for their identification, and to differing extents, their protection through various state agencies.

Description and Examples

State law defines natural areas as any area of land or water that retains its natural character and supports or contains endangered, threatened, or rare plants, animals, and ecological systems, or rare or unique geological, hydrological, natural historical, scenic or similar features of scientific and educational value. These resources can be placed in one of four broad categories: (1) Rare and endangered plant habitat; (2) Rare and endangered wildlife habitat; (3) Rare natural communities and ecosystems; and (4) Unique geologic, hydrologic and other similar features. These resources are difficult to describe generally since their significance involves uniqueness, scarcity, or exemplary characteristics.

The rarity of particular plant species depends upon a number of factors involving numerical scarcity, special habitat requirements, geographical restrictions, range limitations and population vulnerability. Endangered plants are those in danger of extinction throughout all or a significant portion of their range within the state, while threatened plants are those likely to become endangered within the foreseeable future. Examples of rare plants in LURC's jurisdiction are numerous. One of the most well-known is Furbish's lousewort. The banks of a 140-mile stretch of the St. John River provide the only recorded location in the U.S. of Furbish's lousewort, which is listed as an endangered species. Most of the lousewort locations are protected voluntarily by landowners through the Critical Areas Register of Maine's Natural Areas Program or the *St. John River Resource Protection Plan*. Three other plant species, which are under review for endangered/threatened status, grow along streams or rivers in the jurisdiction. These are the auricled twayblade, St. John oxytrope, and New England violet.

As with plants, Maine's endangered wildlife species are those in immediate danger of extermination within the state, while threatened wildlife are those species that will become endangered if populations experience further decline. In addition, other species have been identified as needing special attention to prevent them from becoming endangered or threatened. Under the Maine Endangered Species Act, the Maine Department of Inland Fisheries and Wildlife identifies the essential habitat areas which provide physical or biological

Cypripedium Reginae or Showy Lady's Slipper, a rare plant in Maine

features essential to the conservation of endangered or threatened wildlife. Designation as essential habitat occurs only when habitat loss has been identified as a major factor limiting a species' recovery. It offers protection against projects that will significantly alter or unreasonably harm the habitat. Both bald eagle and roseate tern nesting areas have been designated as essential habitats in Maine, and piping plover and least tern nesting, feeding, and brood-rearing areas are proposed for such designation. The jurisdiction hosts both bald eagle and roseate tern nesting areas.

Interacting plants, animals and their common environment form natural communities which recur across the landscape. Occurring together over a particular portion of the landscape and held together by some common physical or biotic feature, natural communities form ecosystems. Natural communities are not equally common, and hence, rare or exemplary natural communities and ecosystems are scattered about the LURC jurisdiction. The old-growth forest at Big Reed Pond is unique because of its size and variety of communities. Over 5,000 acres in size, the area supports no rare or exemplary vegetation types, but the total complex of vegetation is unusual. It is a truly undisturbed system, large enough to continue intact, and no other place in Maine will be qualitatively similar to it, now or in the future.

Unique geological, hydrological, natural historical, scenic, and similar features comprise the final category of natural areas. The diverse nature of these resources make them the most difficult to describe as a group. The Critical Areas Register of Maine's Natural Areas Program lists many of them. Examples within the jurisdiction include rare fossil deposits portraying evidence of the development of life, unusual rock formations created by the action of flowing water, and striking waterfalls set in remote locations.

Uses and Values

The varied natural areas resources of LURC's jurisdiction provide many significant opportunities for education and scientific research. Because of the scarcity and uniqueness of some resources, they offer the chance to study and analyze aspects of natural resources and systems that are only known through theoretical, rather than practical, research and analysis.

The concept of biodiversity is particularly relevant to LURC, because of the Commission's statutory obligation to both preserve ecological and natural values and encourage the multiple use of land and resources. The value of biodiversity lies in its variety, which is a basic property of nature that sustains ecosystems, supports human populations, and provides an extensive array of food, fiber, health, economic, recreational, aesthetic, and other benefits. Keeping natural systems functioning helps to maintain those benefits, provides opportunities for research, and reduces the need for costly and difficult efforts to save individual species or to recreate natural communities.

Natural areas resources also render recreational benefits. Many people plan activities around visits to such areas merely to view a scarce or outstanding resource. However, depending upon the nature of the resources, they can be degraded or destroyed if human use exceeds their capacities for disturbance.

LURC Regulatory Approach

LURC uses various methods to protect significant natural areas within its jurisdiction. In some instances, the Commission has placed particular natural areas in protection subdistricts. The St. John River Resource Protection Plan, developed as a cooperative effort by landowners along the river and adopted by the Commission, identifies the habitat of Furbish's lousewort as sensitive areas and maps its locations. The Fish and Wildlife Protection (P-FW), Mountain Area Protection (P-MA) and Wetlands Protection (P-WL) Subdistricts afford protection to rare and endangered alpine and wetland species to the extent that they are located in zoned areas.

The Commission also designates certain natural areas as Unusual Area Protection (P-UA) Subdistricts. Some of the unique geologic, hydrologic and scenic features of the state occur within state parks which are zoned P-UA, such as Mother Walk Falls, Screw Auger Falls and Table Rock in Grafton Notch State Park. Other unique areas are not in state parks. For example, both Gulf Hagas, a narrow, slate-walled canyon three miles long with numerous waterfalls, and the Hermitage, an exemplary old-growth white pine stand, receive protection through P-UA zoning.

Gulf Hagas

The Commission coordinates its review of applications with other state agencies responsible for tracking and protecting various species and resources. The Natural Areas Program conducts ongoing inventories of rare plants, natural communities, and critical areas resources, maintains a data base from the inventories and other information sources, and administers the Critical Areas Register. The Maine Department of Inland Fisheries and Wildlife carries out the inventories and programs needed to enhance or maintain rare fish and wildlife populations. When the Commission receives an application that involves unique or exemplary natural areas, LURC staff forward a copy to the pertinent state agency for review and comment. Depending upon the level of concern expressed by the review agency about a proposed land use activity and its impact upon the resource, the Commission encourages applicants to incorporate the recommendations into the proposal.

Natural Areas Issues

Threats to Resources

Any land use or development activity, including timber harvesting, that is proposed on or near a natural areas site has the potential to disrupt, degrade or destroy the resource. The nature of the threat varies according to the characteristics and vulnerability of the particular resource. The type of protection afforded by the Commission ranges from applying conditions as part of the permitting process to restricting some activities in areas that fall within protection subdistricts. In all cases, identification of the resources is the critical first step in the process.

Needs

Since the jurisdiction covers such an expansive area, the identification of resources remains an issue in terms of efforts to provide protection. In all likelihood, many significant natural areas resources await discovery, and so, because of lack of information, may be destroyed by human activities.

Protection measures used by the Commission include placement in the Unusual Area Protection (P-UA) Subdistrict. The P-UA designation, however, has been used only for the most outstanding resources, leaving many without reliable protection, although inclusion on the Critical Areas Register provides voluntary protection by landowners. An attempt to standardize the criteria for coverage in P-UA's may serve to extend protection to more of these resources within the jurisdiction.

Water Resources

The Land Use Regulation Commission is charged by law with the responsibility "to prevent the despoliation, pollution and inappropriate use of the water" in the jurisdiction. Most of Maine's rivers originate in the region. Therefore, the Commission is responsible for preserving good water quality for major portions of the state. This water is valuable for drinking, for crops, for commerce and industry, and as a resource for recreation and energy.

Lake Resources

Characteristics

The jurisdiction is host to a wealth of lake resources unparalleled in most regions of the nation. These lakes, ranging in size from less than one acre to over 70,000 acres, help to define the Maine landscape. Among these lakes are some of the largest and least developed water bodies in the northeastern United States.

Largely the gift of receding glaciers, these lakes display such variety that it is impossible to characterize a typical Maine lake. Some are shallow; others are deep and cold. Some are regular in shape and ringed with dense forest; other have irregular shorelines, islands, rock outcroppings, and beaches.

Fully one-half of Maine's lakes are located in the jurisdiction. These 3,000 ponds and lakes cover more than 680,610 acres, or about 6% of the area, and provide about 35 million feet of shoreline. Half of these lakes are less than 10 acres in size, representing less than 2% of total lake surface area and about 12% of total shoreline. Fourteen of Maine's 15 largest lakes are wholly or partially within the jurisdiction, including Moosehead Lake, the largest lake in the state with 74,890 acres.

The Maine Wildland Lakes Assessment was initiated in 1986 to establish a systematic base of natural resource and land use information on all lakes within the Commission's jurisdiction. The study considered all lakes with a surface area of 10 acres or more. Approximately 1,500 lakes, representing about one-half of the lakes but over 98% of

Grand Lake Matagamon

the total lake surface area in the jurisdiction, met this size requirement . A number of smaller lakes were added to the study because they were found to possess especially noteworthy natural resource values.

Information on fisheries, scenic quality, botanic features, physical characteristics, wildlife, shoreline character, and cultural resources was collected and evaluated to determine the resource significance of these features on each lake. The resource classifications of all lakes studied are shown in Appendix C of the Commission's Land Use Districts and Standards.

The study also collected information on land and water use characteristics, including access, zoning, water level fluctuation, proximity to services, ownership, and public water supply. The information collected in this study is recorded in an extensive database of these lakes.

Uses

Lakes have contributed to the state's social, economic, and environmental well-being. Historically, they provided convenient transportation routes for Indians and early settlers, as well as for Maine's emerging timber industry. They also served as sites for early hunting camps and resorts, establishing Maine as the nation's premier sporting camp state.

Today, lakes in the jurisdiction serve many important functions. They have long been a magnet for outdoor enthusiasts, offering experiences ranging from lakeshore camps to remote fishing and canoeing. Distinguished by generally excellent water quality, most lakes provide high quality fish and wildlife habitat, recharge groundwater supplies, and contribute to the flow of streams and rivers.

Lakes attract more residential development than any other geographic feature in the jurisdiction. The annual number of new dwellings approved on lakes increased steadily in the latter part of the 1980's, rising from roughly 100 in 1985 to 218 in 1990. Since 1971, 53% of all new lakefront dwellings have been located on lakes considered to be of statewide significance with multiple outstanding vales. These lakes represent 40% of the total shoreline in the jurisdiction, indicating that development is disproportionately concentrated on high value lakes.

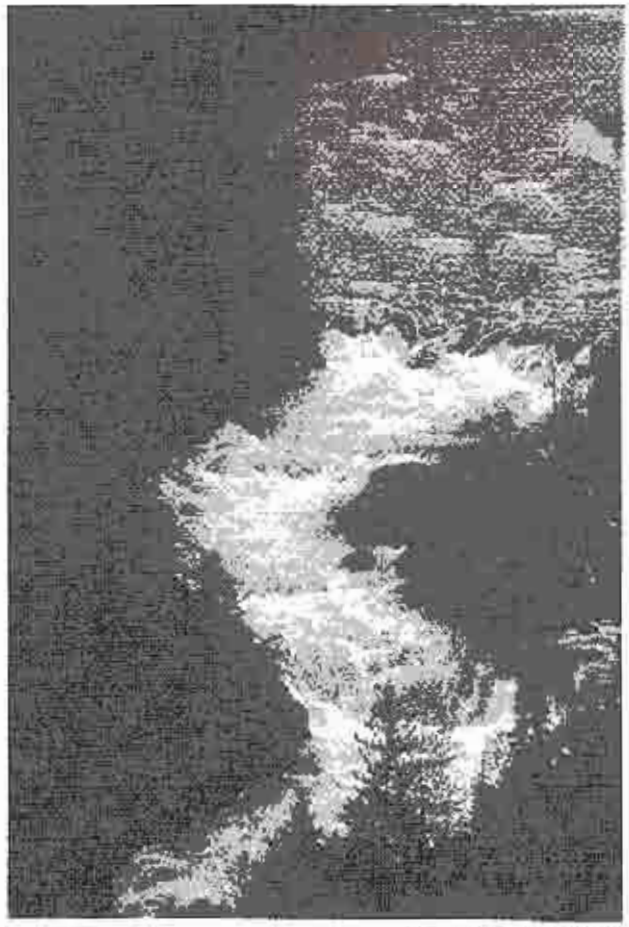
Other forms of development also occupy shoreland, including sporting camps, recreational development, and some commercial uses. Since 1971, 46% of all Development Permits have been located in shoreland areas.

River and Stream Resources

Characteristics

Maine is unique in the northeastern United States in the number and diversity of significant natural and recreational river resources that it possesses, including:

- River gorges, waterfalls and white water rapids identified as being outstanding geological or hydrological features;
- More miles of undeveloped free-flowing rivers than any other state in the Northeast, including particularly significant undeveloped stretches along the Allagash, Aroostook, East Machias, Machias, Penobscot, Pleasant, St. Croix, and St. John systems;



Long Fall, Dead River

- River corridor segments which provide habitat for diverse populations of rare and endangered plant species;
- Famous Atlantic and landlocked salmon, trout and other game fisheries; and
- Significant white water, back country, and other canoeing and rafting experiences.

Six major drainage basins span the jurisdiction: the St. John/Aroostook River Basin; Penobscot River Basin; Kennebec River Basin; Eastern and Central Coastal Basins; Androscoggin River Basin; and Western Coastal Basins. Large portions of four of these basins are located in New Hampshire, Quebec, or New Brunswick.

Of the 19 major rivers in the state, five are considered pristine – the Allagash, Dead, East Branch of the Penobscot, West Branch of the Penobscot, and Fish Rivers – all of which lie within the jurisdiction. Seven of the 19 are pristine in their upper watersheds, before entering more industrialized areas. These are the Androscoggin, Aroostook, Kennebec, Penobscot, Presumpscot, St. Croix, and St. John Rivers.

The Maine Rivers Study, carried out by the Department of Conservation with assistance from the National Park Service in the early 1980's, comprehensively inventoried and assessed 32,000 miles of the state's streams and rivers. Over one thousand miles of these rivers were classified as "A" Rivers of highest significance, because they possess a variety of unique and/or outstanding recreational or natural values of greater than state significance. Nearly 760 miles of these Class "A" rivers lie in LURC jurisdiction. In addition, the study classified several hundred miles of rivers and tributaries as "B," having natural and recreational values with outstanding statewide significance.

Uses

Maine's rivers have always been an important part of the state's culture and economy. They were used for travel by Native Americans, European settlers, and 19th-century tourists. Millions of logs were floated down the Penobscot, the Kennebec and the Androscoggin during annual spring log drives until the 1970's.

Today, recreation is the most common use of rivers and streams. Several rivers in the jurisdiction provide spawning grounds for trout, salmon, and other important game fish and attract people from all over the Northeast to fish. Other recreational opportunities include boating, particularly whitewater canoeing, kayaking and rafting.

Development on rivers and streams – while less common than along lakeshores – is a common land use. Approximately 11% of new dwellings approved in the jurisdiction between 1971 and 1991 were located on a river or stream.

Another significant use, limited to certain river and stream segments, is hydropower. Since hydropower development often conflicts with a river's other resource values, namely, recreation, scenic preservation, and fisheries, the state moved to establish a balance between these values in the 1980's.

The 1981 State Energy Policy recommended developing hydropower on all sites where the advantages of a facility outweigh the adverse impacts. However, recognizing that once a site is developed for hydropower the resource is permanently altered, this policy directed the Department of Conservation to work with environmental, economic, energy, and other appropriate interests to identify river stretches in the state that provide unique recreational opportunities or natural values and to develop a strategy for the protection of these areas. This led to the Maine Rivers Study and subsequent enactment of the Maine Rivers Policy in 1983.

Groundwater

Characteristics

The jurisdiction has vast, largely untapped groundwater supplies. Surficial deposits of sand and gravel and fractured bedrock provide pathways and storage for percolating ground water. Recharge areas collect precipitation and surface water that replenishes these aquifers.

Limited mapping has been done of groundwater supplies within the jurisdiction. Almost no mapping has been done of sand and gravel aquifers in Piscataquis and Somerset counties excepting their southernmost areas. Most of the maps for the rest of the jurisdiction are at a scale of 1:50,000 and are designed for use in locating sites favorable for development of water supplies or unfavorable for storage or disposal of waste or hazardous material. Some areas in western Maine and Penobscot County have been mapped in greater detail as part of the Significant Aquifers Project. For

these areas, maps which more accurately characterize each sand and gravel aquifer are available at scales of 1:50,000 or 1:24,000. No maps of bedrock aquifers are available in the jurisdiction, but some information is available from the Maine Geological Survey.

3

Uses

The most common use of groundwater in the jurisdiction is as drinking water supply, mostly for individual dwellings and camps. Commercial uses such as lodging establishments, restaurants and recreational facilities also use significant amounts of groundwater. In addition, several public water suppliers serving adjacent towns have wellheads in the jurisdiction.

At least one water bottling operation is located in the region. Other potential uses of groundwater includes snowmaking and industrial processing.

LURC Regulatory Approach

Lake Resources

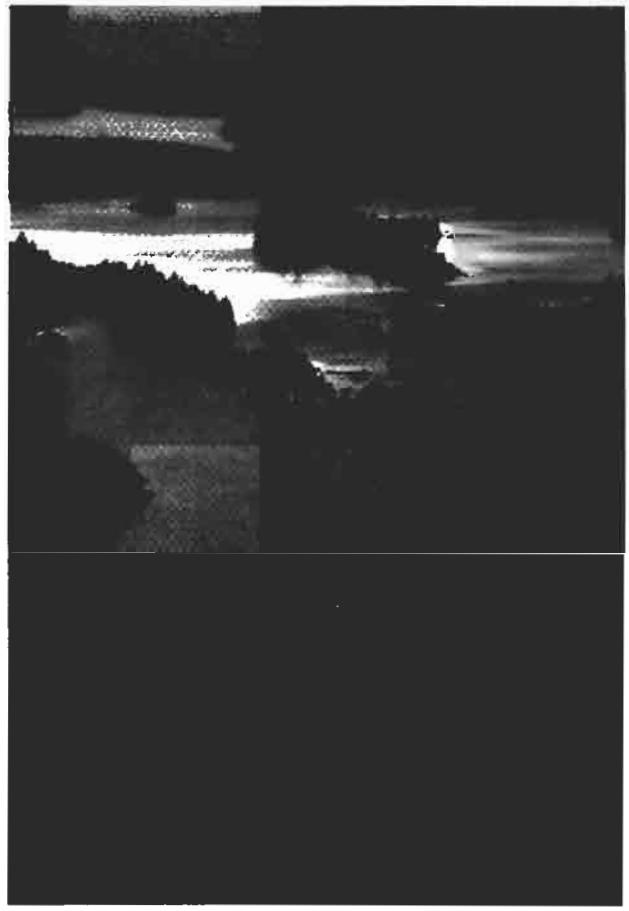
The Commission has established minimum shore frontage, setback and clearing standards focused on preventing environmental degradation and providing reasonable development opportunities. The Great Ponds Protection (P-GP) Subdistrict was applied to the shoreland of all lakes and ponds "not to wholly preclude residential and recreational development on Great Ponds, but to regulate these areas so that development will not degrade the waters, recreational potential, fishery habitat, or scenic character..." Shoreland can be rezoned to Development subdistricts if certain criteria are met.

The Commission has always made a special effort to provide for shoreland development while maintaining protection of significant natural values. Nonetheless, in the mid-1980s, faced with increasing demand for lakefront property, the Commission acknowledged the danger that, even with minimum standards, lakes in its jurisdiction might, by attrition, lose the very character that makes them so unique.

In response to this threat, the Commission in 1990 adopted an *Amendment of the Comprehensive Land Use Plan Regarding the Development and Conservation of Lakes in Maine's Unorganized Areas.* The Amendment forms the foundation of the Commission's Lake Management Program. The main purposes of the program are (1) to establish a comprehensive database on lakes in the jurisdiction and (2) to develop policy and implementation measures that provide more comprehensive protection for lakes.

Under the program, lakes in the jurisdiction are grouped into seven management classes based on natural resource values and land use characteristics identified in the Wildlands Lake Assessment. Each class has specific planning and management objectives designed to protect and enhance its values. One category of lakes, Management Class 3, consists of those lakes determined to be potentially most suitable for development.

A major new planning policy under the program is "to guide lake development based on identified land use characteristics and natural resource values, conserving important values and directing development toward those lakes or lake areas most capable of absorbing new development." The pro-



Aziscohos Lake

gram also establishes a general planning guideline that development on lakes will remain below an average of one dwelling unit per 400 feet of shore frontage, and one dwelling unit per 10 acres of lake surface area.

A number of important elements from the Lakes Management Program have been incorporated into the Commission's rules. Two lake management classes, "High Value, Least Accessible Lakes" and "Remote Ponds," have been zoned as Recreational Protection (P-RR) Subdistricts in which motorized access and development is prohibited. Lakes in another Management Class, "High-Value, Accessible Ponds," have been zoned as Accessible Pond Protection (P-AL) Subdistricts, which limit development densities to one development unit per mile of shore frontage. In addition, seven factors identified as most important in reviewing the suitability of lake-related development proposals have been incorporated into the Commission's *Land Use Districts and Standards*.

Through this program, the Commission is encouraging the use of concept plans as a flexible alternative to traditional shoreland regulation. Concept plans are landowner-created, long-range plans for the development and conservation of a large block of shoreland on a lake or group of lakes. Adopted concept plans are zoned as Resource Protection (P-RP) Subdistricts.

The Lake Management Program includes a number of other important elements that are central to the Commission's lake planning efforts. The entire *Amendment of the Comprehensive Land Use Plan Regarding the Development and Conservation of Lakes in Maine's Unorganized Areas* is included as an appendix to this plan.

River and Stream Resources

As with lakes, the Commission has established minimum shore frontage, setback and clearing standards for rivers and streams. The Shoreland Protection (P-SL) Subdistrict has been applied to the shoreland of rivers and streams to "regulate certain land use activities in certain shoreland areas in order to maintain water quality, plant, fish and wildlife habitat and in order to protect and enhance scenic and recreational opportunities."

Following publication of the Maine Rivers Study, an executive order established the protection of certain rivers (substantially the "A" classified rivers) and urged independent regulatory agencies, such as LURC, to take action consistent with that policy.

The Commission responded in 1983 by amending its rules to clarify that river and stream segments identified in the Governor's executive order as meriting special protection expressly qualify for Recreation Protection (P-RR) zoning. Water impoundments and commercial and residential development are prohibited in the P-RR Subdistrict, making this zone a particularly appropriate one to carry out these policies.

The rule change adopted by the Commission and approved by the Legislature was based upon the Commission's enabling statute, its stated goal of protecting significant natural and recreational river resources, the Maine Rivers Study, and the Executive Order on Maine Rivers Policy and provided a solid foundation for application of protection zones to river resources of documented importance.

The Commission has employed a variety of measures to protect important recreational river stretches from incompatible development. A total of 659 miles of rivers are protected by Recreation Protection (P-RR) and Resource Plan (P-RP) zoning. Most high value rivers have been placed in the P-RR zone which prohibits dams, water impoundments, and commercial and residential development. Significant stretches of the St. John and Penobscot rivers have been placed in P-RP zones, whereby a special management plan provides for the protection and management of the river resource.

Sections of the Aroostook and Big Machias rivers have been placed in the Special River Transition Protection (P-RT) Subdistrict. This zone is designed specifically for stretches of river that have significant recreational resource values, lie in "transitional" areas between "big woods" and downstream organized areas, and have a significant community present. The zone is similar to the P-RR zone but allows for limited development utilizing a combined setback/frontage standard. Stretches of river that have been protected are listed in the appendix of this Plan.

Under Maine law, hydropower development is regulated by the Maine Rivers Policy and the Maine Waterway Development and Conservation Act. The Maine Rivers Policy protects outstanding segments of rivers and streams in the state from the construction of new dams, and provides for more stringent review of the additional development of dams

existing on these segments. The Maine Waterway Development and Conservation Act requires a single application and permit for the construction of all hydropower projects, structural alteration of some projects, and certain maintenance and repair projects. The Commission and Board of Environmental Protection jointly adopted administrative regulations for hydropower projects in 1987. These regulations, which provide for a single application and permit for hydropower, are administered by LURC for hydropower projects located completely within the jurisdiction.

Floodplains

The Commission uses the 100-year flood plain for purposes of delineating flood prone areas and establishing appropriate land protection strategies. The 100-year flood plain is the area in which flooding is normally expected to occur once in 100 years, or where there is a 1% chance of being flooded in any given year. The Commission has designated a Flood Prone Area Protection (P-FP) Subdistrict that prohibits most forms of building, since such preventive controls are far more effective and less expensive than after-the-fact protection such as flood walls and dams. The restrictions in this subdistrict comply with an agreement between the Commission and the Federal Emergency Management Agency (FEMA) that requires that building development be limited in this way so that flood insurance can be made available to persons within the jurisdiction.

Groundwater

Certain types or densities of development can have negative impacts on the quality and quantity of groundwater in an aquifer. Such impacts can result in long-term damage in which remedial actions are infeasible or extremely expensive. Recognizing this, the Commission has created an Aquifer Protection (P-AR) Subdistrict which limits development of potentially polluting activities on aquifers which are in use or anticipated to be used for public, industrial, or agricultural purposes.

Water Resource Issues

Lake Issues

Development

In the 1980's, demand for recreational property grew substantially throughout the northeastern United States. Land costs along Maine's coast increased dramatically and many lakes near population centers became saturated with recreational camp development. Seeking both affordable property and a less crowded atmosphere, many people desiring to purchase waterfront property turned their attention to the recreational opportunities offered by lakes in the Commission's jurisdiction.

Between 1985 and 1991, over one-third of all building and development permit applications within the jurisdiction involved lakes. Subdivision applications have been even more heavily weighted toward lakes; since 1982, 44% of all subdivision lots have been located adjacent to lakes. Expanding both in number and distribution across the region, lakeshore development has significant potential to affect important natural values, timber harvesting, and traditional uses associated with lakes, such as sporting camps.

The Commission's Lake Management Program was developed largely to address concerns that development was incrementally eroding

Smith Pond, Pre-LURC Development

the values of lakes in the jurisdiction. This program has clearly been successful in protecting certain classes of ponds (particularly the 281 ponds in Management Classes 1,2 and 6,) and in providing more guidance in the review of shoreland-related development. The program has been less clearly successful in guiding development toward the lakes viewed as most suitable for development, and in protecting the values of other lakes, especially lakes with outstanding multiple values (Resource Class 1A) that do not fall into Management Classes 1, 2 or 6.

The policies and implementation measures of the plan provide an opportunity to better guide the location of growth on lakes jurisdiction-wide and to refine zoning approaches in rapidly growing regions with high-value lakes. With the rate of shoreland development expected to continue and possibly accelerate during the late 1990's and into the 2000's, the Commission will regularly assess the effectiveness of its efforts in protecting lake values.

In 1992, the Maine Legislature established the Great Pond Task Force to coordinate the state's great pond protection efforts. Among its many charges is the responsibility to develop a great ponds management strategy and a classification system that is reasonably consistent with the Commission's classification system. The Commission will work with the Task Force to ensure a coordinated approach in dealing with Maine's great ponds.

Lake Water Quality

Water quality is an important characteristic of lakes, because the quality of a lake's water in large part determines its value and usefulness as a resource. A lake with good water quality is much more valuable than one which has poor quality water. In most cases, the quality of a lake's water depends upon the nature and use of its watershed – the area which supplies water to the lake.

All water bodies are susceptible to water quality degradation, either by natural processes or human activities. Eutrophication is the natural aging process of lakes and ponds. Young lakes, also called oligotrophic lakes, are characterized by

Post-LURC development on Aziscohos Lake

having low dissolved nutrients and abundant oxygen and are usually deeper, clearer, and colder than older lakes. Oligotrophic lakes often contain cold water fish such as salmon and trout. Old lakes, also called eutrophic lakes, have a high nutrient concentration but low oxygen content. Some fish, such as bass and pickerel, can exist in these eutrophic lakes because they can live in waters with high temperatures and lower dissolved oxygen. But many cold water fish species important for recreational purposes cannot survive in eutrophic lakes.

Human activities can speed up the natural aging process in lakes. This is known as cultural eutrophication. Disturbance of the land surface by activities such as timber harvesting, agriculture, or land development disrupts natural processes which normally purify water moving through and across land. As a result, water moving through disturbed land picks up considerably more sediment and nutrients than water moving through undisturbed woodland.

This runoff and its load of nutrients ultimately reaches lakes and ponds. Most lakes can utilize a certain amount of phosphorus without undergoing a significant change in water quality. However, if the amount of phosphorus entering a lake increases above natural levels and remains high over time, the lake will eventually become overfertilized and produce excessive amounts of algae. Algal blooms reduce water transparency, deplete the oxygen supply, and alter fisheries and wildlife habitat, resulting in reduced recreational appeal and impaired water potability.

Water quality in Maine is relatively good, and the waters of the jurisdiction, particularly eastern and northern Maine, are generally quite pristine. There are a few exceptions. The Department of Environmental Protection, which administers state and federal mandates regarding lake water quality, has identified 51 lakes in LURC jurisdiction that are considered to have impaired water quality based on the incidence of repeated algal blooms or other factors. The impaired water quality of these lakes is primarily due to organic enrichment caused by agriculture, timber harvesting, or watershed development.

Nine lakes that do not or will not meet state water quality standards despite implementation of technology-based controls for point and nonpoint sources of pollution have also been identified. These lakes are listed below:

Long Lake (T17 R04 WELS)
Cross Lake (T17 R05 WELS)
Square Lake (T16 R05 WELS)
Madawaska Lake (T16 R04 WELS)
Fitzgerald Pond (Big Squaw Twp.)
Spencer Pond (East Middlesex Canal Grant)
Haley Pond (Dallas Plt.)
Pleasant Lake (T04 R03 WELS)
Onawa Lake (Elliottsville Twp.)

Additional work designed to improve water quality is planned for Long Lake, Cross Lake, and Madawaska Lake.

One thousand of the lakes in the jurisdiction have been designated by the Commission as water quality limiting lakes (WQLL). The WQLL designation was originally developed to address the cumulative impact of individual lot development on lake water quality. The Commission recognizes that the formula for identifying water quality limiting lakes is rudimentary and understands the need to update its approach to review of impacts on water quality. To meet this need, Commission staff continues to work with DEP to develop a systematic approach to protecting water quality, one which more accurately reflects the level of knowledge about the relationship between land use and lake water quality.

The state, as part of its Nonpoint Source Management Program, is in the process of developing a set of manuals on Best Management Practices (BMPs) designed to reduce the adverse effects of land use activities on water quality. When these manuals are complete, the state will look to the Commission as well as other agencies to promote use of BMPs through education and other means.

Maintenance of the good lake water quality in the jurisdiction depends largely upon future land use. Conversions of predominantly forested, undeveloped land to low-density residential development within a watershed can adversely affect lake water quality. Forest management also continues to be evaluated for impacts on lake water quality, and agriculture remains a major cause of water quality problems in some agricultural watersheds. The Commission will continue to monitor lake water quality, changes in land use, and seek to minimize the impact of land use on lake water quality.

Surface Use Conflicts

Lakes and ponds are being used by an increasingly diverse group of watercraft, ranging from canoes and small-engine fishing boats to high-powered motor boats. As the diversity of watercraft and the number of lake users increases, so too does the potential for conflicts between uses.

As the principal presence addressing land use issues in its jurisdiction, LURC is sometimes drawn into surface use conflicts. The Commission will work with the Great Ponds Task Force, other state agencies, sportsmens' groups, and other interested parties on this issue and support efforts to establish coordinated and effective approaches. See the Recreation Resources section for a fuller discussion of potential use conflicts on lakes.

River and Stream Issues

Hydropower

Hydropower development was a significant issue in the 1980's, during which time there was strong interest in hydropower development on many rivers in the jurisdiction. Since then, regulations for reviewing hydropower projects have been adopted and responsibility for granting water quality certification has been assigned to the Commission for projects otherwise requiring a permit from the Commission.

Water Quality

The generally pristine quality of its rivers and streams is a distinctive feature of the jurisdiction. Assurance of their continued high quality is important to the future use and value of the region and to other areas downstream.

Most threats to water quality come from nonpoint sources of pollution, principally from timber harvesting and extraction, land development, and agriculture. These and other activities can both accelerate stormwater runoff and contribute pollutants to streams and rivers.

There have been significant advances in the reduction of nonpoint source pollution. The Commission's standards on clearing, roads and water crossings in shoreland areas are aimed at minimizing the movement of pollutants into waters. Efforts to further reduce nonpoint pollution will be focused on educational programs and strict enforcement of these standards. The Commission will also encourage the use of other best management practices for other land uses with potential to affect river and stream water quality.

Shoreland Development

River and stream shoreland is not as heavily developed as lake shoreland, but shoreland development remains a potential issue. Proximity to water is the most sought-after feature for recreational lots in the jurisdiction, and demand for river shoreland may increase. Development of river shoreland will be closely monitored to ensure that it is properly sited and does not adversely affect water quality, recreation, and other values of rivers and streams.

Floodplains

Maine's climate provides conditions conducive to flooding, especially in late winter and early spring. Spring rains, coupled with snowmelt, sometimes produce severe flooding. Ice buildup in lakes and rivers complicate the situation as ice jams often obstruct water flows. The volumes of water released when these jams break can threaten human life, devastate buildings, and damage infrastructure.

The identification and protection of floodprone areas is necessary to protect landowners as well as the public. Poorly conceived uses of flood prone areas contribute to damage caused by floods and can result in severe economic losses for individual landowners and the public in general. Bridges, structures, and other artificial obstructions in flood prone areas can impede water and ice flow. Demolished structures become hazardous debris and create pollution downstream. Collectively, even small structures in flood prone areas reduce flood storage capacity. Preserving flood prone areas in their natural condition augments the normal carrying capacity of a river channel and provides a temporary storage area for flood waters.

Little mapping of floodprone areas has been done in the jurisdiction. The Federal Emergency Management Agency (FEMA) has preliminarily mapped floodprone areas in 30 townships in LURC jurisdiction, but these maps are not always accurate and therefore are of limited value. Since there

is no information on floodprone areas in townships which have not been mapped by FEMA, the Commission has used soil information to identify such areas.

Periodically, the Commission reviews applications for structures in or adjacent to floodprone areas and the lack of good information continues to be a problem. More data on flood levels on lakes and rivers is needed to enable the Commission to make good decisions about where development can safely be allowed.

Groundwater Issues

Potential contamination is the most serious threat facing groundwater supplies. Groundwater contaminants are extremely persistent due to slow groundwater flow rates and minimal biological activity. Almost all groundwater contamination in Maine originates from nonpoint source pollution, principally underground storage tanks, agricultural activities, landfills, road salt storage and application, abandoned hazardous waste sites, and septic tanks.

Collectively, septic systems discharge the largest volume of wastewater into the subsurface environment. The major contaminants of concern are nitrate, bacteria, and viruses. Major factors affecting the potential of septic systems to contaminate drinking water are the density of systems per unit area and hydrogeological conditions.

While the Commission's Aquifer Protection (P-AR) zone is designed to protect important groundwater supplies, its application has been limited in the past due to lack of information. Mapping of aquifers in the jurisdiction has improved, but the issue of identifying areas likely to be used for public or nonresidential uses remains. When the Commission undertakes prospective zoning for development in certain high-growth areas, it will review, as a parallel effort, the need for aquifer protection in these areas.

Where possible, LURC will adopt Best Management Practices for activities that pose a threat to groundwater quality, as recommended by the statewide groundwater protection strategy. The Commission will protect groundwater quality throughout the jurisdiction through proper controls on potentially polluting activities.

The "Meadow" on Monhegan is an aquifer, the island's primary water source

Wetland Resources

Extensive wetland resources exist throughout LURC's jurisdiction. Until the past two to three decades, wetlands were considered wastelands that were inhospitable to people. Draining and filling them was an accepted and desirable practice. Today, these same wetlands are now recognized as vital components of larger ecosystems which perform many valuable functions.

Characteristics

Generally, wetlands are land areas where the water table is at, near, or above the land surface for extended periods of time. Although there are some variations in how wetlands are defined and delineated, most wetlands are identified by the presence of particular types of soils and vegetation that result from or are tolerant of periodic submersion by water.

An estimated 25 to 30% of Maine's total area is wetland. About half of this total is estimated to be forested by evergreen species. The remaining wetlands are a mixture of open meadows, bogs, marshes, swamps, fens and forested deciduous wetlands.

Documentation of the vast array of wetland natural communities and conditions in the jurisdiction is incomplete. However, the U.S. Fish & Wildlife Service has classified and mapped wetlands and deep water habitats in Maine through the National Wetlands Inventory. This mapped information shows the wide variety of wetland conditions ranging from marine intertidal wetlands to inland forested wetlands. Wetland types often converge so that a single wetland classification rarely covers an entire wetland.

In addition to the National Wetlands Inventory, the Maine Natural Areas Program has developed a classification system for all ecosystems and natural communities throughout the state including wetland community types. Additionally, it has identified a number of exemplary and rare wetland community types in the Commission's jurisdiction.

Most wetlands are hydrologically connected to lakes, ponds, rivers, streams, and brooks. However, there are isolated wetland systems whose wetness is sustained through groundwater seepage and/or soil saturation. Most rivers and tributaries are bordered by wetlands as well.

Wetlands underlain by peat deposits are a relatively common feature in the Commission's jurisdiction and are particularly abundant in eastern and northern Maine. By contrast, well drained, mountainous parts of the jurisdiction contain relatively few peatlands.

The jurisdiction contains relatively few coastal wetlands. They are small features found on islands and along the mainland coast. Unlike their freshwater counterparts, coastal wetlands in the jurisdiction are isolated and self-contained, not part of a larger system.

Wetlands can change from one subclass or water regime to another as a result of natural succession, human induced changes, or (to a lesser extent) beaver activities. Wetlands are not static, underscoring the need to periodically update mapped wetland information to maintain a reasonable level of accuracy.

Uses and Functions

Wetlands have many useful functions. They act as natural sponges that absorb, hold, and slowly release surface water. By doing so, wetlands help reduce flood damage by storing water during times of peak water levels. Wetlands also help to protect water quality by acting as settlement basins, filtering suspended sediments and absorbing nutrients and heavy metals. Wetlands also help to stabilize shorelines, absorbing wave action and storm energy, thereby buffering shoreline erosion.

Wetlands offer a range of wildlife and vegetation types, providing habitats for numerous species, including some that are rare in Maine, New England, and in some cases, North America. Wetlands support beautiful orchids, blueberries, cranberries and, is some instances, commercially valuable timber such as cedar and black spruce. Wetlands also provide breeding, feeding, nesting, resting, and wintering areas for a variety of birds, fish, insects, reptiles, amphibians, and mammals. This range of flora and fauna offers opportunities

for hunting, fishing, trapping, photography, nature appreciation, and environmental education.

Compared with the southern part of the state, few wetlands in the jurisdiction have been converted to agricultural uses. By contrast, wetlands (mostly forested) are routinely used for forestry operations. Red maple, black spruce, larch, and to a lesser extent, ash and northern white cedar, dominate forested wetlands, providing sources of wood for the state's forest products industry. Most harvesting activities take place during the winter months when the ground is frozen, thereby reducing environmental damage and increasing mobility in the woods. Due to soil properties and seasonal wetness, these forested wetlands often produce timber at a slower rate than upland areas.

Another use of wetlands has been for mining of peat. Because peat takes thousands of years to form, it is essentially a nonrenewable resource. Peat resources do not underlay all wetlands or even a particular wetland type, and therefore have to be considered a special attribute of certain wetlands. In the early 1980's, the University of Maine developed a classification system for Maine's peatlands for the Department of Conservation.

Wetland

A minimum of 35,000 acres of commercially valuable peat exists in the jurisdiction. While peat extraction has not been very active over the last 20 years, the potential exists for this resource to be more heavily utilized in the future. The principal uses of peat are as horticultural and agricultural soil amendments, however, peat is also used as a fuel. There is a large- scale peat mining operation on a 1,000-acre raised peat bog known as the Denbo Heath in T16 MD and Deblois. Peat as an energy resource is discussed in the Energy Resources section of the plan.

Historically, the Commission has received relatively few applications to alter jurisdictional wetlands. The reason is twofold: first, most people avoid activities in a wetland if they have a choice; and secondly, under Commission rules and standards, several common land use activities, such as forest management, do not require a permit.

LURC Regulatory Approach

The Commission regulates land use activities in coastal and inland freshwater wetlands by designating them as Wetland Protection Subdistricts (P-WL). The Commission's purpose for protecting wetlands is to conserve wetlands in essentially their natural state because of the indispensable biologic, hydrologic and environmental functions which they perform.

Wetland Resource Issues

In the 1990's, a major challenge for the state has been reaching agreement on a system of comprehensive wetland protection that offers consistent standards and non-duplicative review. The Commission has participated in efforts to improve and streamline wetland regulation in the state and these efforts continue.

Overlapping Jurisdiction

Historically, the Commission has shared regulation of wetlands in the jurisdiction with two other agencies: the Army Corps of Engineers and the Maine Department of Environmental Protection (DEP). Under section 404 of the federal Clean Water Act, the Army Corps of Engineers is responsible for regulating activities in wetlands regardless of their size. Under the Natural Resource Protection

Act (NRPA), DEP is charged with regulating wetlands in all areas of the state. Except for larger projects, the DEP has generally deferred to the Commission in permitting wetlands within the jurisdiction. But the Commission has shared regulatory jurisdiction over wetlands with the Army Corps of Engineers.

Regulators, business leaders, and environmentalists agree that regulatory duplication serves neither the resource nor the applicant. Through legislation adopted in 1992 and 1995, the Maine Legislature sought to address the issue of duplicative review and a number of other wetland issues. The 1992 initiative directed the Commission to consider changes in its approach to make it more consistent with NRPA. The 1995 law amended NRPA, and resulted in the state's participation in a federal program that eliminates the need for Army Corps permits in many situations.

The Commission is in the process of modifying its approach to be consistent with the amended NRPA law. It also seeks agreement with the Army Corps on streamlined permitting. But there are several issues that must be addressed as this is accomplished, as discussed below.

Mapping

The Commission utilizes a straightforward, map-based approach to wetland protection. If a proposed activity will affect a mapped wetland, a permit is required. This system works well to protect wetland resources as long as the maps provide an acceptable level of accuracy in identifying wetlands of the type and size the Commission wishes to protect.

The National Wetland Inventory for Maine, the Commission's principal source of wetland information, provides the best source for mapping wetlands at a reasonable cost. A study of the accuracy of this inventory in the Commission's jurisdiction shows that the existence and type of wetlands over 3 acres in size are accurately depicted 90-92% of the time. There is, however, an ongoing debate in the scientific community about the accuracy of this Inventory in identifying wetland boundaries.

The Maine Department of Environmental Protection and Army Corps have traditionally required field delineation of wetlands. This approach provides more accuracy than National Wetland Inventory maps, but requires applicants to pay the cost of delineating wetland boundaries, preparing alternatives analysis, and documenting wetland functions.

The Commission believes that a map-based approach is still the best method for ensuring adequate protection of wetlands at a reasonable cost to the regulated community. Issues concerning mapping accuracy could be addressed by requiring applicants to perform field delineations in some cases, particularly for projects with potential for significant potential wetland impacts.

Consistency with NRPA

The Natural Resource Protection Act regulates both forested and nonforested wetlands. As a result of the 1994 amendments, NRPA also now applies to wetlands of any size. Under the NRPA approach, wetlands are classified into different tiers according to assessed values, with permitting requirements varying accordingly.

As of 1996, LURC regulated only nonforested wetlands, 10 or more acres in size. Modifying the Commission's rules to be consistent with NRPA will result in more comprehensive wetland protection. Scientific evidence suggests small and forested wetlands can provide as many valuable functions as their larger and nonforested counterparts.

But regulating these additional wetlands will also add complexity to the Commission's approach. Instead of one Wetland Protection (P-WL) Subdistrict, there will likely be several types of P-WL zones, each with its own set of allowed uses and standards.

As the Commission revises its rules, a likely issue will be whether variations between LURC's approach and NRPA are justified based on the distinctive characteristics of the jurisdiction or the Commission's role as a local planning entity. Wetland value rating is a good example. Under NRPA's approach, wetlands characterized as "scrub-shrub" are rated as low value. The Commission, on the other hand, has traditionally treated large wetlands of this type as high value. In resolving these and other such issues, the Commission will strive for regulatory consistency, while ensuring that its approach adequately protects the jurisdiction's wetland resources.

Staffing and Resources

Making the Commission's approach consistent with NRPA also has implications for staff

resources. Including wetlands that are forested and less than 10 acres in size will significantly increase the number of wetlands regulated by the Commission. While most forestry related activities would be exempt from review in these areas, development activities would not.

Particular aspects of the amended NRPA law could require considerable staff time and expertise. For example, a provision exists allowing applicants to mitigate wetland impacts by constructing new wetlands elsewhere. This concept of mitigation has merit, but the Commission will address staff capacity and training issues before incorporating such provisions into its approach.

Wildlife and Fisheries Resources

The wildlife and fisheries resources of the jurisdiction provide economic, environmental and social benefits to the people of Maine. Residents and visitors enjoy Maine's woods, streams, and lakes for recreation, many forms of which are related to or dependent on the presence of fisheries and wildlife.

Characteristics

Wildlife

The lands of the jurisdiction offer a rich mix of forests, mountains, hills, uplands, wetlands, flats, lakes, ponds, rivers, streams, and coastal areas. This diverse landscape supports a large number and diversity of wildlife species, some of which are rare. Wildlife species which inhabit the area include deer, black bear, moose, bobcat, beaver, snowshoe hare, fisher, a variety of waterfowl, ruffed grouse, bald eagle, several hawks and owls, numerous other small mammals, amphibians, and passerine birds. The success of individual species depends upon the quality and quantity of appropriate habitat – principally food, water, and cover located proximate to each other.

Numerous game species are actively managed by the Department of Inland Fisheries and Wildlife (IF&W). Managed species include black bear, moose, white-tailed deer, furbearers, and game birds. Management measures include established hunting seasons and harvest limits. Endangered and threatened species are also managed by IF&W through measures such as habitat protection, management agreements, permit review and other strategies.

Fisheries

The jurisdiction's large number and variety of inland waters support populations of 44 of Maine's 51 inland fish species. Although significant warmwater fisheries (primarily bass, pickerel, and perch) exist within the jurisdiction, coldwater fisheries (primarily trout and salmon) predominate. As of 1994, IF&W had surveyed 1,070 lakes (645,887 acres) that are wholly or partially within LURC jurisdiction. Of these, 808 (375,810 acres) provide coldwater fisheries only; 119 (86,353 acres) provide warmwater fisheries only; and 63 (180,458 acres) provide a combination of coldwater and warmwater sportfish species. Only 79 lakes (3,231 acres) have no sport fisheries.

Each fish species, inland, as well as coastal and estuarine, has specific physical, chemical, and biological habitat requirements. Water temperature, water chemistry (especially dissolved oxygen), availability of suitable habitat for reproduction, food supplies, and competition from other species of fish are all factors which influence the ability of a species to survive. The introduction of new species (e.g. the Northern Pike and Muskie) may also have the effect of displacing native fish species with which they compete. Stocking and removal of fish also affect the distribution and abundance of fish species in Maine.

Uses Affecting Fisheries and Wildlife Resources

Each species has specific foraging, shelter, and breeding habitats. All fish and wildlife species rely upon the maintenance of sufficient habitat to support population levels, and physical alterations to the landscape can destroy habitat for individual

species. Certain habitat types, such as high value wetlands, deer wintering areas, fish spawning and nursery areas, and coastal nesting islands, are of particular concern because of the dependence of various animal species upon them for survival. For example, in the case of colonial nesting birds, a relatively small development on an island used for nesting can significantly disrupt an entire colony.

Wildlife

Research has demonstrated that riparian areas – lands immediately adjacent to waterbodies – serve as important habitat and travel corridors for a wide-range of wildlife species. Disruption of these areas by clearing or development can therefore have far-reaching impact. A number of the Commission's rules and standards are aimed at minimizing alterations in riparian areas.

The principal use of the forest in the jurisdiction is for timber production. Forest management clearly alters wildlife habitat, but there is disagreement over its overall impact on wildlife. One view is that the impacts of timber harvesting are scattered over the landscape and relatively short-term. Species whose habitat is disrupted move to other areas; other species actually benefit from harvesting activities.

Another view is that intensive timber harvesting has far reaching impacts on wildlife species, and, on balance, harms more species than it helps. According to this perspective, negative impacts are caused not only by removal of vegetation, but also by construction of haul roads which fragment habitat and impede movement.

The Commission believes evidence is lacking showing a link between timber harvesting and an overall decline in the jurisdiction's wildlife resources. The forest environment is a dynamic system that has long adjusted to natural and human alteration. Maintenance of riparian areas may be the most effective way of assuring that wildlife can adapt to these changes.

For particular species, the effects of timber harvesting are better documented. The deer population depends upon a diversity of habitats which must include a mix of food and cover. While dense conifer stands provide winter cover, open areas where new growth can occur are necessary for food production. Thus, some timber harvesting contributes to the health of the deer herd by making food available. Extensive harvesting in areas needed for winter shelter, however, can cause deer mortality.

On the other hand, extensive harvesting has had a positive influence on the density and distribution of moose. Moose, which were rare in the jurisdiction 40 years ago, are now abundant due in part to the creation of new habitat. Large clearcut areas, which are unsuitable for deer browsing because of their lack of cover, are ideal for moose.

Fisheries

Many uses of land and water resources affect the quantity, quality, and diversity of aquatic habitat available for fish. The demand for forest products and outdoor recreation, combined with increased accessibility, can stress the fishery resource. Many human uses of land and water resources can alter one or more of the basic physical, chemical, or biological characteristics of aquatic habitat. These influence the composition of fish species through changes in conditions necessary for survival of the less adaptable species, especially the coldwater game fishes. Thus, uses of the land and water can cause far-reaching, sometimes irreparable changes in water quality and aquatic habitat.

Disruptions to fish habitat and fisheries are most easily identified from large scale alterations of the landscape. But small scale alterations, while singly causing more subtle changes, can also be important because of their cumulative effects, and because a specific and limited habitat type may be essential to some species of fish. Also, tiny headwater streams may be habitat for game fish fry and the insects and fish upon which they feed.

A variety of land uses affects water quality and aquatic habitats. Among the more obvious are:

- Logging, farming, development, and other land use activities can cause erosion and associated sedimentation of waterbodies. Sedimentation of even small streams affects downstream habitats. Silt inhibits light penetration in the water necessary for photosynthesis. Sedimentation reduces the abundance and diversity of bottom-dwelling invertebrates necessary for the ecological balance and may reduce or eliminate suitable fish spawning and nursery areas.
- Deposits of logs and slash in stream channels may restrict fish movements, smother spawning grounds, cause chemical changes in the water, and change the course of stream channels.

- Cutting trees to the water's edge permits greater exposure of water to sunlight, causing the abnormal warming of waters, sometimes beyond the tolerance limits of cold water species.
- Introduction of toxic chemicals from the use of insecticides, fungicides, herbicides, and mining or other activities may kill fish or essential aquatic organisms in the food chain.
- Improperly placed culverts and bridges may block fish movements and change flow characteristics.
- New logging roads can increase access to once remote areas often increasing fishing pressure in nearby waters and causing a decline in fishing quality.
- Extensive shoreland clearing can result in erosion and sedimentation.
- Filling, dredging, beach construction, or shoreline alteration may eliminate existing fish habitat.
- The construction of dams for hydropower, water storage, flood control, or irrigation purposes can obstruct fish movement and cause fluctuations in stream flows and lake levels which influence fish movements and reproduction. Artificial flowages change aquatic habitat, and often the distribution, abundance, and composition of fish species.
- Permanent structures in the water can change shoreline water and wind currents. This can result in erosion of materials from one area and deposition into another.

A number of these land uses and potential impacts are addressed in the Commission's planning policies and regulatory approach.

LURC Regulatory Approach

The Commission employs two tools to protect fisheries and wildlife resources: zoning and land use standards. Because of the sensitivity of certain fragile habitats to competing uses, the Commission has created the Fisheries and Wildlife Protection (P-FW) zone. With this zone, the Commission protects critical portions of identified deer wintering areas, important coastal seabird nesting islands, and other significant wildlife habitat while allowing

limited timber harvesting and other traditional uses that are not destructive of these habitats. To date, the Commission has placed in the P-FW zone over 185,000 acres of deer wintering areas and critical portions of 40 coastal islands used for nesting. The Commission also employs the Recreation Protection (P-RR) zone to protect remote ponds that have coldwater fisheries.

The Commission's other tool to protect fisheries and wildlife resources is land use standards and guidelines regulating timber harvesting, road construction, and structural development activities near water bodies. These guidelines are designed to minimize the potential adverse effects of development upon fisheries and other aquatic life while still allowing for a reasonable degree of development and forest management.

Deer Wintering Areas

The Land Use Regulation statute calls for the Commission to administer a zoning program which protects shelter needed by the deer herd for winter protection. The Commission places an area in the P-FW zone when the Department of Inland Fisheries and Wildlife demonstrates that the area meets specific criteria regarding vegetative conditions and use by deer for shelter. Timber cutting within the zone is regulated, usually according to a plan worked out in the field between the Department's wildlife biologist and the landowner. The goal is to maintain a reasonable degree of winter shelter for deer while allowing for periodic timber harvesting on a sustained-yield basis over the long term.

Twice, the Commission has comprehensively reviewed and discussed its deer wintering area program in response to specific concerns and changes affecting the program. No other aspect of the Commission's programs has elicited such singular attention over the years – a measure of the value of the resource to all parties.

The first review was undertaken in 1981 to take a fresh look at certain issues that had been extensively debated since the inception of the deeryard zoning program. The Commission held a conference on deer yard zoning in the fall of 1981 at the University of Maine at Orono. Based on what was learned at the conference, together with experience the Commission had gained from administering the deeryard program and itself debating the issues, the Commission produced a policy document designed to state comprehensively its policies regarding the deeryard zoning issues.

Some of the issues identified in the document have since been addressed, while others remain pertinent. The Commission outlined its approach to ensuring that small landowners are not unduly burdened by protection of the deer resource. It established a policy on timber harvesting in stands damaged by budworm which may have relevance to future insect or disease outbreaks. It also addressed a number of administrative issues. These policies have been updated, integrated with the Commission's 1990 policies on the deeryard program, and are outlined in detail in the appendices to this Plan.

The second review was initiated in 1988 in response to an increase in proposals to zone new deeryards. IF&W attributed the upsurge in new deeryards to deterioration of existing yards (due in part to budworm damage), an increasing deer population, and other factors. Landowners were concerned about the impact of future rezoning proposals on their expectations for land in which they have made substantial investments.

After reviewing the program, its efficacy, and its impact on the regulated community, the Commission concluded that the fundamental structure and function of the program were both necessary and appropriate. Nevertheless, the Commission discovered several opportunities for improving the program by adopting a policy document and a number of rule changes.

The Commission expanded the informational requirements associated with the rezoning process to provide a broader context in which to consider individual rezoning proposals and thereby improve the basis for decision-making. It revised the rezoning process to provide equal opportunity to landowners to evaluate whether the biological criteria of the zone are met. It defined the scope of the deeryard program by establishing that zoned deeryard acreage shall not exceed 3.5% of each Deer Management District. This cap allows for considerable, but not unlimited expansion of the program. And, the Commission clarified the criteria for removing deeryard zoning from an area.

In the policy document, the Commission provided the rationale for the rule changes described above. It also addressed a number of other areas, some of which have seen positive developments since the policy document was approved. IF&W has produced guidelines for timber harvesting in deeryards that are designed to bring more consistency and predictability to the process of developing harvesting plans. IF&W has also assessed and

made recommendations on virtually all remaining interim deeryard zones, resulting in the final elimination of these temporary zones from LURC zoning maps.

Finally, IF&W and several landowners have worked cooperatively to develop innovative long-range management plans for deeryards. Several such plans are in place, protecting large areas of deer wintering habitat outside of the regulatory framework. The Commission encourages development of these plans which substantially increase the timber management options available to landowners.

The 1990 policy document has been updated and integrated with the 1982 policy document and is included in the appendices to this Plan.

Fisheries

The Commission has applied Recreation Protection (P-RR) zones to 177 remote ponds in its jurisdiction. The lakes that have been placed in the P-RR Subdistrict are all highly prized brook trout ponds, but one also has a landlocked salmon fishery and two have populations of the rare blueback trout (a variation of the Arctic char). These lakes were incorporated into the Commission's lake management program, adopted in 1990, as Management Class 6 lakes.

The principal purpose of the P-RR zone is to provide a degree of protection to areas that support unusually significant primitive recreation opportunities. Remote ponds represent the few remaining waters that have limited access (not accessible by 2WD vehicle within 1/2 mile) and offer a near-wilderness fishing experience that consists both of high quality fishing and high aesthetic values. The P-RR zoning indirectly provides some protection to the coldwater fisheries in the ponds so zoned.

The Commission continues to consider application of the P-FW zone to identified salmon and other important fishery habitats found in its jurisdiction.

Wildlife and Fisheries Resource Issues

Impact of Development on Habitat

It is difficult to document the overall impact of development on fish and wildlife in the jurisdiction to date. IF&W believes the development which has occurred has had minimal effect thus far, but is concerned about certain trends, in particular, the disproportionate amount of development that has concentrated along lakeshores and other riparian areas which are important to both fish and wildlife.

Forty-three percent of all building permits have been issued in riparian areas. Scattered development interrupts and fragments this habitat, becoming a barrier to furbearers, deer, and smaller animals. If the trends of the last 20 years continue without actions to guide future development to appropriate areas, IF&W believes problems will arise for fish and wildlife resources.

Essential Habitat

Pursuant to the Maine Endangered Species Act, the Department of Inland Fisheries and Wildlife can designate "Essential Habitat" for endangered or threatened species. Essential habitat protection in Maine is applied to bald eagle and roseate tern nest sites, and additional listed species may receive attention in the future. Any project which is wholly or partly within a designated Essential Habitat and is permitted by a state agency requires approval by the Commissioner of Inland Fisheries and Wildlife.

Because of the protection provided to bald eagle nest sites by these provisions, the Commission has not taken steps to apply the P-FW zone to these areas. In the future, the Commission will consider whether identified essential habitat warrants designation as a P-FW zone.

Bald Eagles